



Cisco ASR 1000 Series Aggregation Services Routers Hardware Installation and Initial Configuration Guide

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GLOSSARY

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Preface

This preface discusses the objectives, audience, and organization of the *Cisco ASR 1000 Series Aggregation Services Routers Hardware Installation and Initial Configuration Guide*. The following sections are in this preface:

- [Document Revision History, page xi](#)
- [Document Objectives, page xii](#)
- [Audience, page xii](#)
- [Document Organization, page xii](#)
- [Safety Warnings and Cautions, page xiii](#)
- [Related Documentation, page xviii](#)
- [Obtaining Documentation and Submitting a Service Request, page xix](#)

Document Revision History

The Document Revision History table below records technical changes to this document.

Document Version	Date	Change Summary
OL-13208-03	November 2008	Improved the two-minute window allotted time to replace a power supply. You now have up to a maximum of five minutes to replace the power supply.
OL-13208-02	October 2008	Added Cisco ASR1000-ESP20 and Cisco ASR1000-ESP10-N support. Updated eUSB device graphics and replacement information.
OL-13208-01	May 2008	This is the first version of this document for the Cisco ASR 1000 Series Routers (Cisco ASR1006 Router, Cisco ASR1004 Router, Cisco ASR1002 Router).

Document Objectives

This publication describes the installation of the Cisco ASR 1000 Series Aggregation Services Routers, replacement or upgrading of field-replaceable units (FRUs), and troubleshooting of the Cisco ASR 1000 Series Routers hardware. The purpose of this guide is to enable the safe and efficient installation of the Cisco ASR 1000 Series Aggregation Services Routers.

Audience

This publication is primarily designed for the person responsible for installing, maintaining, and troubleshooting the Cisco ASR 1000 Series Aggregation Services Routers. The users of this guide should:

- Be familiar with electronic circuitry and wiring practices.
- Have experience as electronic or electromechanical technicians.
- Have experience in installing high-end networking equipment. Certain procedures described in this guide require a certified electrician.

Document Organization

The major sections of this installation and configuration guide are:

Chapter and Appendix Number and Title	Description
Preface	The preface provides objectives, audience and organization of this manual.
Chapter 1 Cisco ASR 1000 Series Routers Hardware Overview	This chapter provides an overview of the Cisco ASR 1000 Series Aggregation Services Routers.
Chapter 2 Cisco ASR 1000 Series Router Components	This chapter describes the components for each Cisco ASR 1000 Series Aggregation Services Router.
Chapter 3 Preparing Your Site for Installation	This chapter provides site preparation guidelines for installing the ASR 1000 Series Routers.
Chapter 4 Cisco ASR 1006 Router	This chapter describes the Cisco ASR 1006 router and how to install it.
Chapter 5 Cisco ASR 1004 Router	This chapter describes the Cisco ASR 1004 router and how to install it.
Chapter 6 Cisco ASR 1002 Router	This chapter describes the Cisco ASR 1002 router and how to install it.
Chapter 7 Cisco ASR 1000 Series Router Power Up and Initial Configuration	This chapter provides basic system startup and initial configuration information.

Chapter and Appendix Number and Title	Description
Chapter 8 Replacing the Cisco ASR 1000 Series Routers Field-Replaceable Units	This chapter provides instructions for removing and replacing shared port adapters, ASR 1000 RP1 internal hard drive, AC and DC power supplies, the Cisco ASR1000-ESP forwarding processors, the Cisco DIMM memory card, the Cisco memory stick, and the Cisco ASR 1000 Series Route Processor 1.
Appendix A Cisco ASR 1000 Series Routers Specifications	This appendix provides system specifications and pinouts.
Appendix B Troubleshooting Initial Startup Problems	This appendix provides basic system startup troubleshooting information.
Glossary	Listing of Cisco ASR 1000 Series Routers terms with definitions.
Index	Listing of terms for the Cisco ASR 1000 Series Routers

Safety Warnings and Cautions

Most safety warnings for the Cisco ASR 1000 Series Routers are placed in relevant sections throughout the document. For translated safety warnings, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Aggregation Services Routers*. Below is Statement 1071, the Warning Definition statement, complete with translated warnings.

Warning Definition



Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing

BELANGRIJKE VEILIGHEIDSIINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus TÄRKEITÄ TURVALLISUUSOHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelyyn liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET**Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS**Warnung WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.**Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI**Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES**¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES**Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR**Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejte helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!**Figyelem ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES**Advarsel** VIGTIGE SIKKERHEDSANVISNINGER

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemeskade. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER**تحذير****إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE**Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY**Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ**

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθειες πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ**אזהרה****הוראות בטיחות חשובות**

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במגעים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה**Opomena VAŽNI BEZBEDNOSNI NAPATCTVIJA**

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ**Upozornenie DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD**Warning**

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030

Related Documentation

Your Cisco ASR1000 Series Routers and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- All documentation related to the Cisco ASR 1000 Series Routers is listed in the online [Cisco ASR 1000 Series Aggregation Services Routers Documentation Roadmap](#). Information in this master index includes troubleshooting tools and documentation, regulatory compliance and safety information, and installation and replacement information. Also see the *Cisco ASR 1000 Series Port Adapter Documentation Roadmap* for specific shared port adapters supported on the Cisco ASR1000 Series routers and the *Cisco ASR 1000 Series Routers Troubleshooting Roadmap*.

Some of the Cisco ASR1000 Series Routers documentation that is listed on the [Cisco ASR 1000 Series Aggregation Services Routers Documentation Roadmap](#) includes:

- The *Cisco ASR 1006, ASR 1004, and ASR 1002 Routers Quick Start Guide* contain installation and configuration information. It contains quick reference information about chassis or parts installation.
- The *Cisco ASR 1000 Series Aggregation Services Routers Troubleshooting* document contains information to help you troubleshoot problems with the Cisco ASR1000 Series Routers.

- The *Regulatory Compliance and Safety Information for Cisco ASR 1000 Series Aggregation Services Routers* document provides international agency compliance, safety, and statutory information for wide-area network (WAN) interfaces for the Cisco ASR 1000 Series Routers.
- Cisco ASR 1000 Series shared port adapter documentation.
- Cisco IOS software documentation contains Cisco IOS software configuration information and support. See the modular configuration and modular command reference publications in the set that corresponds to the software release installed on your Cisco hardware.
- To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the [Software Advisor](#) tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum IOS requirements for individual hardware modules or components.

**Note**

Access to this tool is limited to users with Cisco.com login accounts.

- Cisco Documentation DVD (See the “[Obtaining Documentation and Submitting a Service Request](#)” section on page xix.)

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.



CHAPTER 1

Cisco ASR 1000 Series Routers Hardware Overview

The Cisco ASR 1000 Series Aggregation Services Routers are the next generation midrange router products. The system is based on Cisco QuantumFlow Processor technology using a family of Cisco-developed processors.

The Cisco ASR 1000 Series Routers target both enterprise and service provider applications but with higher performance and improved availability. The specific applications covered by Cisco ASR 1000 Series Routers are:

- Enterprise applications—Intended as the mid-size aggregation and gateway router typically residing in a regional or large branch office:
 - WAN aggregation at Cisco Enterprise core
 - Internet gateway
 - Branch or regional office aggregation
 - Remote access aggregation
- Service provider applications—Intended as the low-end service provider edge and broadband aggregation device with similar throughput:
 - High-end customer premises equipment (CPE) for business-quality Internet access
 - Provider edge (PE) and high-end customer edge (CE) for Layer 2 VPN or Layer 3 VPN services
 - Broadband aggregation—PPPoE/PPPoA aggregation and Service Selection Gateway (SSG)
 - Low-end Ethernet aggregation

This chapter provides an overview of the Cisco ASR 1000 Series Routers and includes the following information:

- [Cisco ASR 1000 Series Routers, page 1-2](#)
- [Cisco ASR 1000 Series Routers Configurations, page 1-32](#)
- [Field-Replaceable Units, page 1-4](#)
- [Functional Overview, page 1-4](#)
- [Cisco Product Identification Standard, page 1-15](#)

Cisco ASR 1000 Series Routers

The Cisco ASR 1000 Series Aggregation Services Router is Cisco next-generation, modular, highly services-integrated routing platform designed with the flexibility to support a wide range of packet forwarding, system bandwidths, performance, and scaling. The overall system architecture is common across the chassis.

The Cisco ASR 1000 Series consists of three different versions:

- [Cisco ASR 1006 Router Description, page 4-1](#)
- [Cisco ASR 1004 Router Description, page 5-1](#)
- [Cisco ASR 1002 Router Description, page 6-1](#)

All three models use the powerful Cisco QuantumFlow Processor which provides performance and resiliency for network processors.

The Cisco ASR 1000 Series Routers deliver multiple services embedded in the Cisco QuantumFlow Processor. The services supported on the Cisco Packet QuantumFlow Processor include security services (for example, encryption and firewall), quality of service (QoS), Network Based Application Recognition (NBAR), broadband aggregation, and session border controller, among others.

Cisco ASR 1000 Series Routers Features

The Cisco ASR 1000 Series Aggregation Services Routers use different field replaceable units. The processors are the Cisco ASR 1000 Series Route Processor 1 (RP1), Cisco ASR 1000 Series Embedded Services Processor (Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, and Cisco ASR1000-ESP20), and the Cisco ASR 1000 SPA Interface Processor (SIP). The Cisco ASR 1000 ESP is based on Cisco QuantumFlow Processor technology.

The Cisco ASR 1000 Series Routers contains the following features:

- Online insertion and removal (OIR) capability
- Route processor and embedded services processor redundancy in the Cisco ASR 1000 Series Routers
- Control processor for ASR 1000 Series SPA Interface Processor
- Control processor for embedded services processors (Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, or Cisco ASR1000-ESP20)
- 10Gbps and 20Gbps interconnect between Cisco QuantumFlow Processor with redundant Cisco ASR 1000 Series ESP to mirror data for stateful features
- Power supply redundancy
- Environmental monitoring and reporting functions
- Family of routers using common hardware and software architecture
- Centralized forwarding design (all network traffic passes through one engine)
- Front-to-back airflow—Allows you to mount the router from either front or back into 19-inch equipment rack
- Supports half-height shared port adapters (HHSPAs) and full-height shared port adapters (FHSPAs)
- Single midplane design (all connectors on one interface midplane)

- One 10/100/1000-Mbps Ethernet Management port—To be used only as a management port; not to be used as an Ethernet interface port
- Both 25-MHz and 50-MHz shared port adapter operation
- High availability software architecture

The Cisco QuantumFlow Processor processing provides:

- Architecture to address Cisco ASR 1000 Series Router performance, cost, power, and feature velocity
- Next Generation forwarding and queuing subsystems for Cisco routers to provide data path acceleration.

The Cisco ASR 1000 Series Router processor system performs the following system management functions:

- Sending and receiving routing protocol updates
- Managing tables, caches, and buffers
- Monitoring interface and environmental status
- Providing Simple Network Management Protocol (SNMP) management through the console and Telnet interface
- Accounting for and switching of data traffic
- Booting and reloading images

Cisco ASR 1000 Series Routers Configurations

The Cisco ASR 1000 Series Routers consist of a number of packaging configurations. The chassis configurations are modular with separate field-replaceable units (FRUs) for the Cisco ASR 1000 Series Route Processor 1 (RP1), the Cisco ASR 1000 Series Embedded Services Processor (ESP5, ESP10, and ESP20), and the shared port adapters.

With the exception of the Cisco ASR 1002 Router, all FRUs (Cisco ASR 1000 Series Route Processor 1, Cisco ASR 1000 Series Embedded Services Processor, and SPAs) are designed to work in the different chassis models. (The Cisco ASR1000-ESP20 is not supported in the Cisco ASR 1002 Router.) The power supplies and fan modules are chassis specific. The SPAs are supported in all chassis configurations although there are SPA restrictions in the Cisco ASR 1002 Router.

Table 1-1 lists the Cisco ASR 1000 Series Routers orderable configurations.

Table 1-1 Cisco ASR 1000 Series Routers Configurations

Chassis	Number of I/O Card Slots	Maximum SPAs Supported	Redundant RP1 Option	Redundant ESP Option	Redundant Power Supply Option
Cisco ASR 1006	3	12 HH	Yes	Yes	1 + 1
Cisco ASR 1004	2	8 HH	No	No	1 + 1
Cisco ASR 1002	0	3 HH (1 built-in 4x1GE)	No	No	1 + 1

Field-Replaceable Units

The Cisco ASR 1000 Series routers are easy to service; many of their major components are field-replaceable units (FRUs). The following is a list of the Cisco ASR 1000 Series Routers FRUs:

- Cisco ASR 1000 Series Route Processor 1 (RP1)
- Cisco ASR 1000 Series Embedded Services Processors (Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, Cisco ASR1000-ESP20)
- Shared port adapters
- Cisco ASR 1000 Series SIP (shared port adapter interface processor)
- Cisco ASR 1000 Series RP1 internal hard drive
- Cisco ASR 1000 Series RP1 DIMM memory module (Note that the Cisco embedded ASR1000-RP1 on the Cisco ASR 1002 Router DIMM memory module is not field-replaceable.)
- USB Flash Token Memory Stick
- AC and DC power supplies
- Bracket kit—Custom cable-management brackets mount to each rack-mount bracket to provide cable-management to both sides of the chassis (parallel with card orientation). These brackets are screw-mounted to the rack brackets to allow easy installation and removal. There is a rack-mount bracket for each chassis:
 - Cisco ASR 1006 cable-management brackets contain 5 independent cable-management U-features to provide cable dressing of each card module slot. For SIPs, these brackets work in tandem with SPA product feature cable-management to allow installation and removal of adjacent cards without the need to remove cables.
 - Cisco ASR 1004 cable-management brackets contain three independent cable-management U-features to provide cable dressing of each card module slot. For SIPs, these brackets work in tandem with SPA product feature cable-management to allow installation and removal of adjacent cards without the need to remove cables.
 - Cisco ASR 1002 cable-management brackets contains one independent cable-management U-features to provide cable dressing of each card module slot. These brackets work in tandem with SPA product feature cable-management to allow installation and removal of adjacent cards without the need to remove cables

Functional Overview

This section contains the following topics:

- [Chassis Slot and Logical Interface Numbering, page 1-5](#)
- [MAC Address Information, page 1-8](#)
- [Online Insertion and Removal, page 1-9](#)
- [Environmental Monitoring and Reporting Functions, page 1-10](#)

Chassis Slot and Logical Interface Numbering

The Cisco ASR 1000 Series Routers have a slot numbering system located on both sides of the card module location. The chassis slots are physically numbered from zero starting at the bottom of the chassis. This section describes the slot numbering for the Cisco ASR 1000 Series Routers:

- [Cisco ASR 1006 Router Slot Numbering, page 1-5](#)
- [Cisco ASR 1004 Router Slot Numbering, page 1-7](#)
- [Cisco ASR 1002 Router Slot Numbering, page 1-7](#)

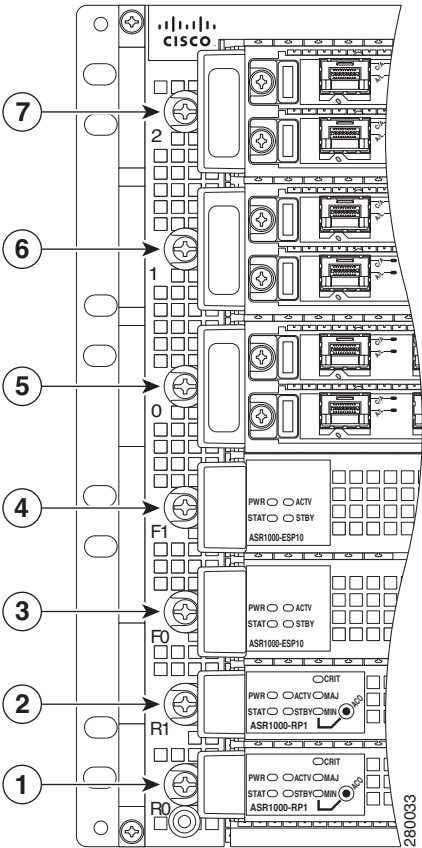
Cisco ASR 1000 Series SPA Interface Processor (SIP) subslots begin their numbering with “0” and have a horizontal orientation. The SIP subslot numbering is indicated by a small numeric label beside the subslot on the faceplate. Some commands allow you to display information about the SPA itself, such as **show idprom module** and **show hw-module subslot**. These commands require you to specify both the physical location of the SIP and SPA in the format, Slot/Subslot, where:

- Slot—Specifies the chassis slot number in the Cisco ASR 1000 Series Routers where the SIP is installed.
- Subslot—Specifies a subslot of the SIP where the SPA is installed.

Cisco ASR 1006 Router Slot Numbering

The Cisco ASR 1006 Router is designed with each slot numbered as shown in [Figure 1-1](#).

Figure 1-1 Cisco ASR 1006 Router – Slot Numbering

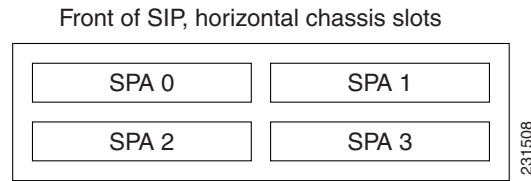


1	Slot RP0 with ASR 1000 Series RP1	5	ASR 1000 Series SIP slot 0
2	Slot RP1 with ASR 1000 Series RP1	6	ASR 1000 Series SIP slot 1
3	Slot FP0 with ASR 1000 Series ESP	7	ASR 1000 Series SIP slot 2
4	Slot FP1 with ASR 1000 Series ESP		

The Cisco ASR 1006 Router contains three Cisco ASR 1000 Series SPA Interface (SIP) supports four subslots for the installation of SPAs.

Figure 1-2 shows the Cisco ASR 1006 Router SPA subslot location.

Figure 1-2 Cisco ASR 1006 Router — ASR1000-SIP10 Subslots

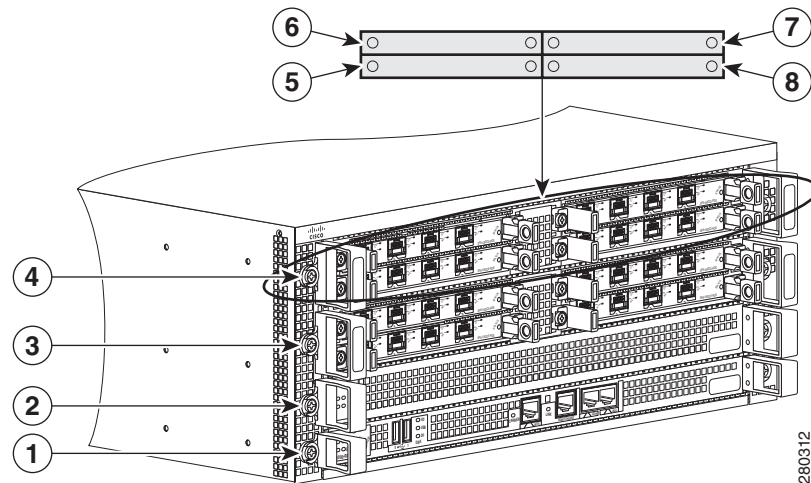


Cisco ASR 1004 Router Slot Numbering

The Cisco ASR 1004 Router contains two Cisco ASR 1000 Series SPA Interface Processors (SIPs) and supports four subslots for the installation of SPAs.

Figure 1-3 shows the Cisco ASR 1004 Router with modules and filler plates installed.

Figure 1-3 Cisco ASR 1004 Router —Front and Side View



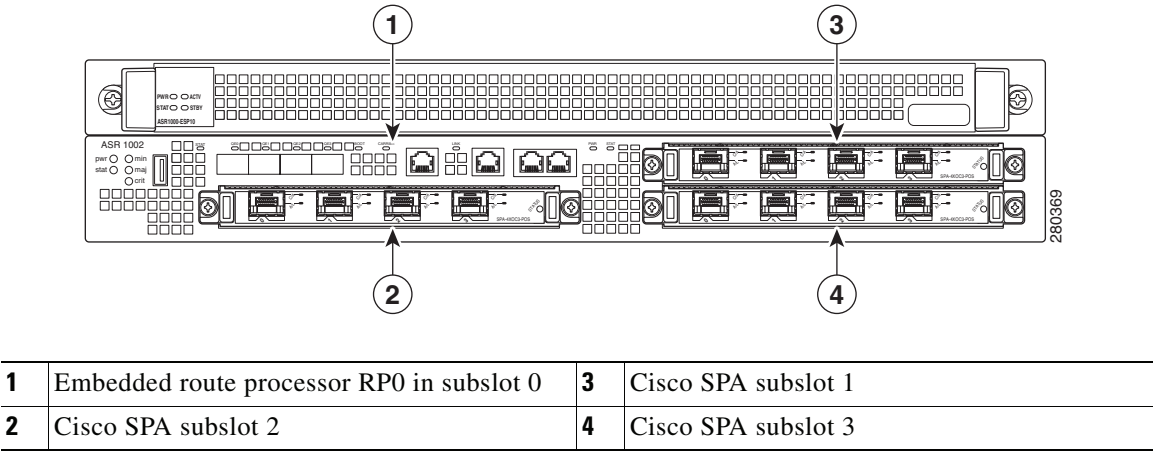
1	Slot RP0 with ASR 1000 Series RP1	5	SPA subslot 2
2	Slot FP0 with ASR 1000 Series ESP10	6	SPA subslot 0
3	ASR 1000 Series SIP slot 0	7	SPA subslot 1
4	ASR 1000 Series SIP slot 1	8	SPA subslot 3

Cisco ASR 1002 Router Slot Numbering

The Cisco ASR 1002 Router contains one Cisco embedded ASR1002 -RP1 which is addressed as R0 and one Cisco ASR1000-ESP5 or ASR1000-ESP10 forwarding processor in slot F0. The Cisco ASR 1002 Router consists of an embedded ASR1000-RP1 and embedded ASR1000-SIP10 board supporting three half-height SPAs or 1half-height and one full-height SPA and one Cisco ASR1000-ESP5 forwarding processor.

The SPA bays are bay 1, bay 2, and bay 3. The built-in 4xGE SPA ports are located in the SPA 0 location and will be addressed as GE 0/0/x. The Cisco ASR 1002 Router provides a built-in 4-Gigabit Ethernet interface and this SPA is physically located on the Cisco embedded ASR1000-RP1 board. The Cisco ASR 1000 Series ESP card is located in slot 1 and labeled as FP0.

Figure 1-4 Cisco ASR 1002 Router Slot Numbering



MAC Address Information

The Media Access Control (MAC) or hardware address is a standardized data link layer address that is required for certain network interface types. These addresses are specific and unique to each port and are not used by other devices in the network. The Cisco ASR 1000 Series Routers assign and control the MAC addresses of its shared port adapters.

You can identify shared port adapter slots by using software commands. To display information about:

- All shared port adapter slots, use the **show interfaces** command.
- A specific shared port adapter slot, use the **show interfaces** command with the shared port adapter type and slot number in the format **show interfaces port-adapter-type slot-number/port-number**.



Note

If you abbreviate the command (**sh int**) and do not specify shared port adapter type and slot number (or arguments), the system interprets the command as **show interfaces** and displays the status of all shared port adapters and ports.

The MAC addresses are assigned to the slots in sequence. For example, in the Cisco ASR 1006 Router, the first address is assigned to slot 0 and the last address is assigned to slot 6. The actual MAC address assignment is 16 MAC addresses per SPA slot for half-height SPAs and 64 per SPA slot for full-height SPAs. Also, the Cisco ASR 1000 Series RP1 RP Management Ethernet port is assigned one MAC address from the end of the pool and for a Cisco ASR 1006 Router with two Cisco ASR 1000 RP1s, each ASR10000 RP1 is assigned one MAC address.

Using this address scheme, you can remove shared port adapters and insert them into other routers without causing the MAC addresses to move around the network or be assigned to multiple devices.

If the MAC addresses were stored on each shared port adapter, online insertion and removal would not function because you could never replace one shared port adapter with an identical one; the MAC addresses would always be different. Also, each time a shared port adapter was replaced, other devices on the network would have to update their data structures with the new address. If the other devices did not update quickly enough, the same MAC address could appear in more than one device at the same time.

**Note**

Storing the MAC addresses for every slot in one central location means the addresses stay with the memory device on which they are stored.

Online Insertion and Removal

In the modular chassis configurations, most Cisco ASR 1000 Series Router field-replaceable units (FRUs) support online insertion and removal (OIR). However, the removal of critical non-redundant FRUs will result in service interruption.

**Note**

As you disengage the shared port adapter from the router, online insertion and removal (OIR) administratively shuts down all active interfaces in the shared port adapter.

Online insertion and removal (OIR) allows you to install and replace shared port adapters while the router is operating; you do not need to notify the software or shut down the system power, although you should not run traffic through the shared port adapter you are removing while it is being removed. Online insertion and removal is a method that is seamless to end users on the network, maintains all routing information, and preserves sessions.

All SPA OIR events are independent of one another. An OIR event of a single SPA does not affect the other SPAs in that ASR1000-SIP10 or any other system function.

**Note**

The Cisco ASR 1002 Router differs from the Cisco ASR 1006 and Cisco ASR 1004 routers. The Cisco ASR 1002 Router supports the Cisco embedded ASR1000-RP1 which is a combined route processor and carrier card which are not field-replaceable units. The Cisco ASR1000-ESP5 or ASR1000-ESP10 are field-replaceable units.

The following is a functional description of OIR for background information only; for specific procedures for installing and replacing a shared port adapter in Cisco ASR 1000 Series Routers, refer to the online configuration note for each shared port adapter.

When you remove or insert a shared port adapter in a Cisco ASR 1000 Series Router, the Control Processor notifies the Cisco ASR1000-RP1, which in turn notifies the forwarding engine control processor (FECF), and then performs as follows:

- Rapidly scans the midplane for configuration changes.
- Initializes all newly inserted shared port adapters, noting any removed interfaces and placing them in the administratively shutdown state.
- Brings all previously configured interfaces on the shared port adapter back to the state they were in when they were removed. Any newly inserted interfaces are put in the administratively shutdown state, as if they were present (but not configured) at boot time. If a similar shared port adapter type is reinserted into a slot, its ports are configured and brought online up to the port count of the original SPA.

Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions allow you to maintain normal system operation by identifying and resolving adverse conditions prior to loss of operation.

**Caution**

To prevent overheating the chassis, ensure that your system is drawing cool inlet air. Over temperature conditions can occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust air exits the chassis and is not drawn into the inlet vent of another device.

Environmental Monitoring

The environmental monitoring functions use sensors to monitor the temperature of the cooling air as it moves through the chassis.

The local power supplies provide the ability to monitor:

- Input and output voltage
- Output current
- Outlet temperature

The router is expected to meet the following environmental operating conditions:

- Operating Temperature Nominal: 5° to 40°C
- Operating Temperature Short Term: 5° to 55°C
- Operating Humidity Nominal: 5% to 85% non-condensing
- Operating Humidity Short Term: 5% to 90% non-condensing
- Operating Altitude: 198 to 13,200 feet (60 to 4000 meters)
- DC Input Range: -40.5 to -72 VDC
- AC Input Range: 85 to 264 VAC

If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds the shutdown threshold, the system controller shuts down the system.

In addition, the power supplies monitor internal power supply temperatures and voltages. A power supply is either within tolerance (normal) or out of tolerance (critical). If an internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

The environmental monitoring functions use the following levels of status conditions to monitor the system:

- Normal—All monitored parameters are within normal tolerances.
- Warning—The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.
- Critical—An out-of-tolerance temperature or voltage condition exists. The system continues to operate; however, the system is approaching shutdown. Immediate operator action is required.

- **Shutdown**—The processor has detected a temperature condition that could result in physical damage to system components and has disabled DC power to all internal components. This condition requires immediate operator action. All DC power remains disabled until you toggle the power switch. Before any shutdown, the system logs the status of monitored parameters in NVRAM so you can retrieve it later to help determine the cause of the problem.
- **Power supply shutdown**—The power supply detected an internal out-of-tolerance overvoltage, overcurrent, or temperature condition and shut itself down. All DC power remains disabled until you toggle the power switch.

Fan Failures

When the system power is on, all fans should be operational. The system continues to operate if a fan fails. When a fan fails, the system displays the following message:

```
router: 00:03:46:%ENVM-3-BLOWER:Fan 2 may have failed
```

If the air temperature exceeds a defined threshold, the system controller displays warning messages on the console terminal, and if the temperature exceeds the shutdown threshold, the system controller shuts down the system.

If the system does shut down because the temperature exceeded the shutdown threshold, the system displays the following message on the console screen and in the environment display when the system restarts:

```
Queued messages:  
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

Reporting Functions

The chassis manager on the forwarding engine control processor manages the local resources of the forwarding processor. It manages the ESI (Enhanced Serdes Interconnect) which are the datapath links on the midplane connecting the Cisco ASR 1000 Series RP1s, SIPs, and standby ESP modules to the active Cisco ASR 1000 Series Embedded Services Processor. It communicates with the chassis manager on the Cisco ASR 1000 Series Route Processor 1 to report the status and health, including detected hardware failures, ESI status, software process status, and the state of thermal sensors.

The Cisco ASR 1000 Series Routers display warning messages on the console if chassis interface-monitored parameters exceed a desired threshold. You can also retrieve and display environmental status reports with the **show environment all**, **show version**, **show inventory**, **show platform**, and **show diag** commands. Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.



Note

The example outputs displayed in this section are from a Cisco ASR 1004 Router. Similar output displays for all Cisco ASR 1000 series routers.

Example 1-1 Show Environment All Command

```
Router#show environment
% Incomplete command.
```

```
Router#show environment all
```

```
Sensor List:  Environmental Monitoring
```

Sensor	Location	State	Reading
V1: VMA	F0	Normal	1791 mV
V1: VMB	F0	Normal	1196 mV
V1: VMC	F0	Normal	1191 mV
V1: VMD	F0	Normal	1093 mV
V1: VME	F0	Normal	996 mV
V1: 12v	F0	Normal	11894 mV
V1: VDD	F0	Normal	3261 mV
V1: GP1	F0	Normal	900 mV
V2: VMA	F0	Normal	3286 mV
V2: VMB	F0	Normal	2495 mV
V2: VMC	F0	10% high	1796 mV
V2: VMD	F0	Normal	1093 mV
V2: VME	F0	Normal	996 mV
V2: VMF	F0	Normal	996 mV
V2: 12v	F0	Normal	11850 mV
V2: VDD	F0	Normal	3261 mV
V2: GP1	F0	10% high	898 mV
Temp: Inlet	F0	Normal	29 Celsius
Temp: Asic1	F0	Normal	47 Celsius
Temp: Exhaust1	F0	Normal	36 Celsius
Temp: Exhaust2	F0	Normal	36 Celsius
Temp: Asic2	F0	Normal	43 Celsius
V1: VMA	0	Normal	1093 mV
V1: VMB	0	Normal	1196 mV
V1: VMC	0	Normal	1494 mV
V1: VMD	0	Normal	1791 mV
V1: VME	0	Normal	2490 mV
V1: VMF	0	Normal	3291 mV
V1: 12v	0	Normal	11894 mV
V1: VDD	0	Normal	3266 mV
V1: GP1	0	Normal	747 mV
V1: GP2	0	Normal	898 mV
V2: VMA	0	20% low	0 mV
V2: VMB	0	Normal	1201 mV
V2: VMC	0	20% low	0 mV
V2: VMD	0	20% low	0 mV
V2: VME	0	20% low	0 mV
V2: VMF	0	20% low	0 mV
V2: 12v	0	Normal	11909 mV
V2: VDD	0	Normal	3271 mV
V2: GP2	0	Normal	903 mV
Temp: Left	0	Normal	25 Celsius
Temp: Center	0	Normal	26 Celsius
Temp: Asic1	0	Normal	36 Celsius
Temp: Right	0	Normal	23 Celsius
PEM Iout	P0	Normal	17 A
PEM Vout	P0	Normal	12 V AC
PEM Vin	P0	Normal	115 V AC
Temp: PEM	P0	Normal	27 Celsius
Temp: FC	P0	Fan Speed 65%	26 Celsius
Temp: FM	P1	Normal	24 Celsius
Temp: FC	P1	Fan Speed 65%	26 Celsius
V1: VMA	R0	Normal	1098 mV
V1: VMB	R0	Normal	3295 mV
V1: VMC	R0	Normal	2495 mV

V1: VMD	R0	Normal	1791 mV
V1: VME	R0	Normal	1499 mV
V1: VMF	R0	Normal	1201 mV
V1: 12v	R0	Normal	11938 mV
V1: VDD	R0	Normal	3261 mV
V1: GP1	R0	Normal	903 mV
V1: GP2	R0	Normal	1242 mV
Temp: CPU	R0	Normal	33 Celsius
Temp: Outlet	R0	Normal	32 Celsius
Temp: Inlet	R0	Normal	26 Celsius
Temp: Asic1	R0	Normal	32 Celsius

Example 1-2 Show Version Command

The **show version** command displays the system hardware configuration, software version, and names and sources of configuration files and boot images.

Following is sample output of the **show version** command:

```
Router# show version
Cisco IOS Software, IOS-XE Software (PPC_LINUX_IOSD-ADVENTERPRISEK9-M), Version
12.2(33)XNA, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2008 by Cisco Systems, Inc.
Compiled Thu 01-May-08 00:29 by mcpre
Cisco IOS-XE software, Copyright (c) 1986-2008 by Cisco Systems, Inc.
```

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A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

```
cisco ASR1004 (RP1) processor with 757182K/6147K bytes of memory.
2 Packet over SONET interfaces
32768K bytes of non-volatile configuration memory.
2097152K bytes of physical memory.
439807K bytes of eUSB flash at bootflash:.
39004543K bytes of SATA hard disk at harddisk:.
```

```
Configuration register is 0x0
```

Example 1-3 Show Inventory Command

The **show inventory** command displays an extended report that includes the product inventory listing of all Cisco products installed in the networking device.

Following is sample output of the **show inventory** command:

```
Router#show inventory
NAME: "Chassis", DESCR: "Cisco ASR1004 Chassis"
```

```

PID: ASR1004          , VID: V00, SN:

NAME: "module 0", DESCR: "Cisco ASR1000 SPA Interface Processor 10"
PID: MCP-CC          , VID: V00, SN: JAB1104064G

NAME: "SPA subslot 0/1", DESCR: "2-port OC3/STM1 POS Shared Port Adapter"
PID: SPA-2XOC3-POS   , VID: V01, SN: JAB1006095Z

NAME: "subslot 0/1 transceiver 0", DESCR: "OC3 SR-1/STM1 MM"
PID: N/A             , VID:      , SN: 2008692

NAME: "SPA subslot 0/2", DESCR: "4-port T3/E3 Serial Shared Port Adapter"
PID: SPA-4XT3/E3     , VID: V01, SN: JAB09210247

NAME: "module R0", DESCR: "Cisco ASR1000 Route Processor 1"
PID: ASR1000-RP1     , VID: V00, SN: JAB110200CQ

NAME: "module F0", DESCR: "Cisco ASR1000 Embedded Services Processor, 10Gbps"
PID: ASR1000-ESP10   , VID: V00, SN: JAB111101A1

NAME: "Power Supply Module 0", DESCR: "Cisco ASR1004 AC Power Supply"
PID: ASR1004-PWR-AC  , VID: V00, SN: ART1103K00C

NAME: "Fan Module 1", DESCR: "Cisco ASR1004 Fan Module"
PID: ASR1004-FAN     , VID: V00, SN: ART1052L01U

```

Example 1-4 Show Platform Command

The **show platform** command displays the output of the current wait policy for each type of connection, as well as any information on the currently configured banners.

Following is sample output of the **show platform** command:

```

Router#show platform
Chassis type: ASR1004

```

Slot	Type	State	Insert time (ago)
0	MCP-CC	ok	16:20:27
0/1	SPA-2XOC3-POS	ok	16:18:49
0/2	SPA-4XT3/E3	ok	16:18:56
R0	ASR1000-RP1	ok, active	16:20:27
F0	ASR1000-ESP10	ok, active	16:20:27
P0	ASR1004-PWR-AC	ok	16:19:27
P1	ASR1004-FAN	ok	16:19:27

Slot	CPLD Version	Firmware Version
0	07091401	12.2(33r)XN1
R0	0706210B	12.2(33r)XN1
F0	07051650	12.2(33r)XN1

Example 1-5 Show Diag Command

The **show diag slot R0 eeprom detail** command displays the configuration hardware information including DRAM and Static RAM (SRAM) on line cards. To display more details than the normal **show diag** command output, use **show diag [slot-number] [details]**.

Following is sample output of the **show diag slot R0 eeprom detail** command:

```
Router#show diag slot R0 eeprom detail
Slot R0 EEPROM data:

EEPROM version           : 4
Compatible Type          : 0xFF
Controller Type          : 1460
Hardware Revision        : 4.7
PCB Part Number          : 73-10253-04
Board Revision           : 03
Deviation Number         : 0-0
Fab Version              : 04
PCB Serial Number        : JAB110200CQ
RMA Test History         : 00
RMA Number               : 0-0-0-0
RMA History              : 00
Top Assy. Part Number    : 68-2625-04
Product Identifier (PID) : ASR1000-RP1
CLEI Code                : UNASSIGNED
Version Identifier (VID) : V00
Manufacturing Test Data  : 00 00 00 00 00 00 00 00
Field Diagnostics Data   : 00 00 00 00 00 00 00 00
Asset ID                 : AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```

Cisco Product Identification Standard

This section describes the Cisco products and services product identification standard. This feature provides you with the ability to effectively integrate and manage Cisco products in your network and business operations.

Unique Device Identifier

The Unique Device Identifier (UDI) is the Cisco product identification standard for hardware products. A product identification standard removes barriers to enterprise automation and can help you reduce operating expenses.

The UDI provides a consistent electronic, physical, and associated business-to-business information product identification standard.

The UDI is a combination of five data elements. [Table 1-2](#) lists the UDI elements.

Table 1-2 Cisco UDI Elements

UDI Data Element	Electronic Visibility	Physical Visibility	Description
PID	Yes	Yes	Product ID, also known as product name, model name, product number
VID	Yes	Yes	Version ID
SN	Yes	Yes	Serial number, the unique instance of the PID (see Figure 1-5 , Figure 1-7 , and Figure 1-6 in the next section for location of the serial number label)
Entity Name	Yes	No	Type, such as chassis, slot, or power supply
Product Description	Yes	No	Additional product information

The combination of serial number and product ID (PID) is unique and consistent across all Cisco products. The PID that is coded on hardware is called a base product identifier.

Additional orderable PIDs may be associated to a base PID. For instance, an orderable PID may describe a packaging configuration for a product or a bundled group of products sold, tested, and shipped together. Specific unique device identifier (UDI) benefits include the following:

- Identifies:
 - Individual Cisco products in your networks
 - PIDs and SNs for service and replaceable products
 - VIDs for product version visibility
- Facilitates discovery of products subject to recall or upgrade
- Enhances inventory automation of Cisco products

The Cisco product identification standard provides the following features:

- Version visibility—Cisco continuously improves products through feature additions. Product changes are indicated by incrementing the version ID (VID), which provides version visibility to help you understand and manage product changes. The VID management ensures consistency of changes from product to product.
- Operating expense reduction— The Cisco UDI provides accurate and detailed network inventory information; identifying each Cisco product in a network element through a standard interface. Cisco operating systems can view and use this data, allowing you to automate your electronic inventory.

- Consistency across product layers—The UDI is designed into hardware products and cannot be overwritten in error. Operating and management systems discover the UDI through standard interfaces and display the UDI in standard outputs. Standard interfaces include the IETF standard ENTITY-MIB.

**Note**

Go to the following URL for complete information on the product identification standard:

<http://www.cisco.com/go/udi/>

Serial Number Label Location

This section contains graphics of each chassis showing the location of the serial number label.

Figure 1-5 shows the serial number location for the Cisco ASR 1006 Router.

Figure 1-5 Cisco ASR 1006 Router Serial Number Label Location

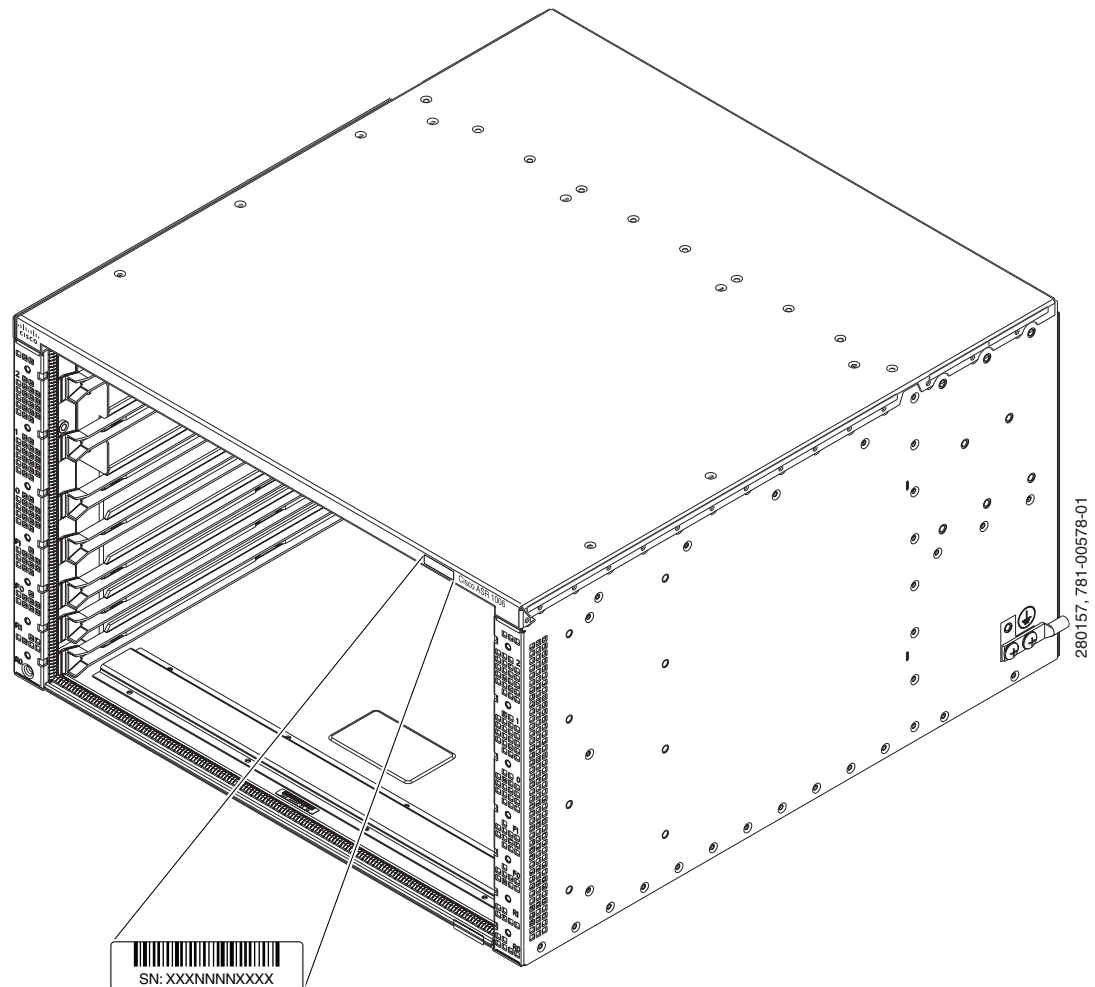


Figure 1-6 shows the serial number label location for the Cisco ASR 1004 Router.

Figure 1-6 Cisco ASR 1004 Router Serial Number Label Location

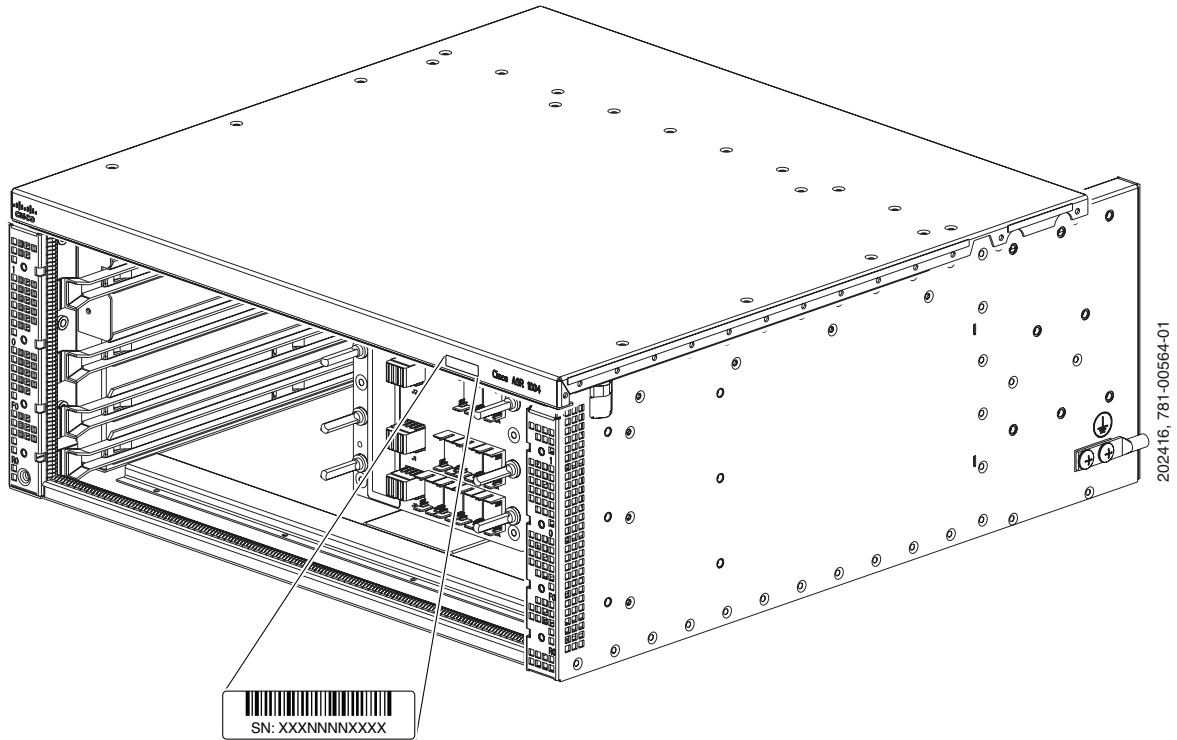
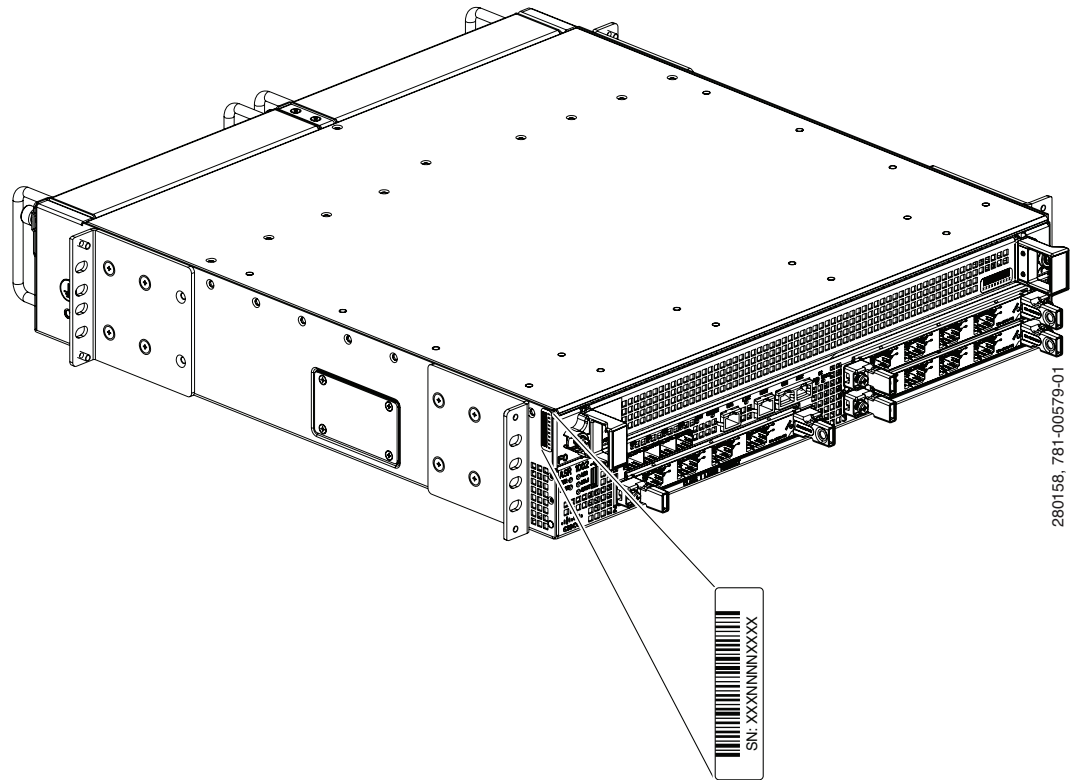


Figure 1-7 shows the serial number label location for the Cisco ASR 1002 Router.

Figure 1-7 Cisco ASR 1002 Router Serial Number Label Location





CHAPTER 2

Cisco ASR 1000 Series Routers Components

The Cisco ASR 1000 Series Routers contain the following components:

- [Cisco ASR 1000 Series Route Processor, page 2-1](#)
- [Cisco ASR 1000 Series Embedded Services Processors, page 2-9](#)
- [Cisco ASR 1000 Series SPA Interface Processor, page 2-13](#)
- [Cisco ASR 1000 Series Router Power Supplies, page 2-16](#)



Note

Throughout this document, the term slot refers to a Cisco ASR 1000 Series Router chassis slot. The Cisco ASR 1000 Series Route Processor 1, Cisco ASR 1000 Series Embedded Services Processor, and Cisco ASR 1000 Series SPA Interface Processor (SIP), and power supplies plug into these slots. Shared port adapters plug into SIP bays.

Cisco ASR 1000 Series Route Processor

The Cisco ASR 1000 Series Route processor is the central network clocking card and runs the network operating system, BINOS kernel plus IOSD (IOS daemon). The Cisco ASR1000-RP1 is responsible for:

- Selection of the active Cisco ASR 1000 Series Route Processor and the Cisco ASR 1000 Series Embedded Services Processor and notification of the Cisco ASR 1000 Series SPA Interface Processor of these events.
- All the control processors communicating and performing packet processing on packets punted to it by the Cisco ASR 1000 Series Embedded Services Processors (ESP).

The Cisco ASR 1000-RP1 has LED status indicators, an RJ-45 plug for DTI and BITS timing reference, and two USB ports which can be used with smart cards for secure key distribution.

Specific system tasks performed by the Cisco ASR 1000 Series Route Processor include the following:

- Runs the router control plane, including network control packets, and connection setup
- User interfaces: 10/100/1000 Management Ethernet, CON/AUX, USB
- Active and standby Cisco ASR 1000 Series RP1 and Cisco ASR 1000 Series Embedded Services Processor master and standby synchronization (Tasks include switchover from failing master to standby.)
- Code storage, management, and upgrade.

- Downloading operational code for SIPs and Cisco ASR 1000 Series Embedded Services Processor over Ethernet out of band channel (EOBC), which is used for communication between the control processors on the Cisco ASR 1000 Series Routers
- Command line interface (CLI), alarm, network management, logging, and statistics aggregation
- Chassis management
- Ethernet out-of-band management
- Punt path processing for packets not supported by the embedded services processors

Cisco ASR 1000 Series Route Processor Features

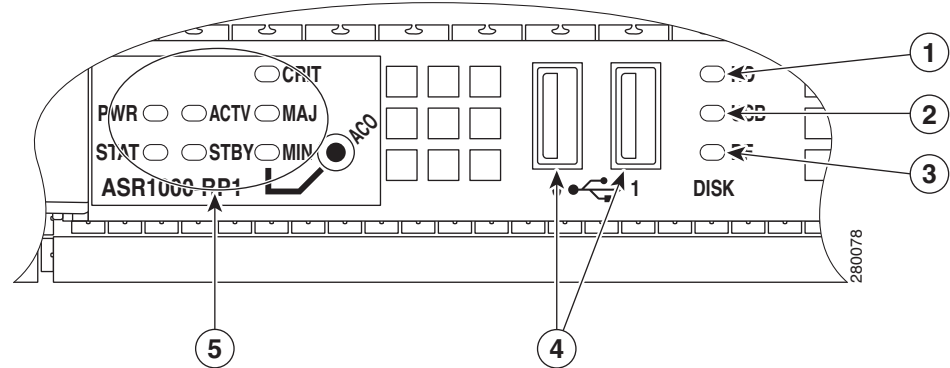
The Cisco ASR1000-RP1 route processors receive and transmit all network packets through the active embedded services processors. The Cisco ASR1000-RP1:

- Provides a configuration repository along with a hard disk drive (optionally a solid-state drive) for logging system statistics, records, events, errors, and dumps (for both the Cisco ASR 1006 Router and Cisco ASR 1004 Router).
- Provides the management interfaces of the platform including Dual Asynchronous Receiver/Transmitter (DUART) that is used for the CON and AUX serial ports. The MGMT Ethernet (ENET) management ports, CLI, status indicators, BITS interface, reset switch, Audible Cutoff (ACO) button, and USB ports for secure keys.
- Provides chassis management (environmental)
- Is a field-replaceable units (FRU) with online insertion and removal (OIR)., except for the built-in RP1 on the Cisco ASR1002 router
- Provides non-volatile storage for the system used as the image and configuration repository along with the logger for system statistics, records, events, errors, and dumps.
- Is responsible for the chassis management including activation and initialization of the other cards, selection or switchover of active versus standby cards, image management and distribution, logging facilities, distribution of user configuration information, and alarm control.
- Provides control signals and Ethernet out of band channel (EOBC) for the two Cisco ASR 1000 Series Embedded Services Processors and one other Cisco ASR 1000 Series Route Processor 1.
- Includes control signals for monitoring the health of power entry modules, shutting down the power and driving alarm relays located on the power entry modules.
- The Cisco ASR 1000 Series RP1 module can be configured with either a 40 GB or a 32 GB disk.

The Cisco ASR 1000 Series route processor module consists of a front panel label for indicator and control functions and a separate label for the I/O connectors. The Cisco ASR1000-RP1 model number labeling is located next to the left card module handle. The modules also contain card handles to assist in insertion or removal of the module.

Figure 2-1 shows the Cisco ASR 1000 Series Route Processor faceplate.

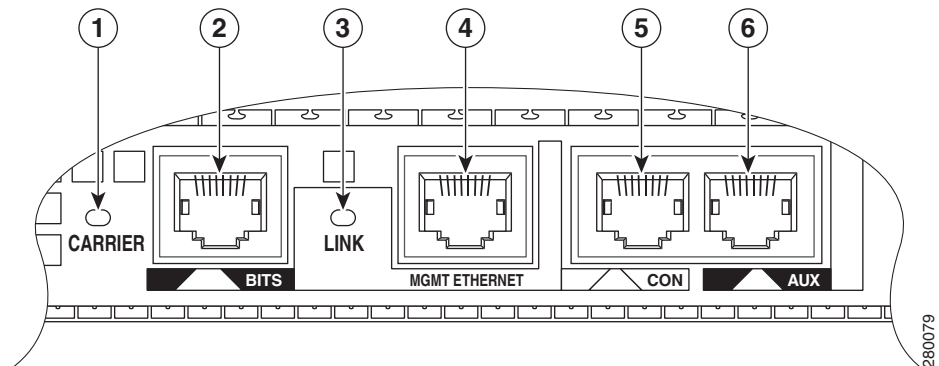
Figure 2-1 Cisco ASR Series 1000 Route Processor Faceplate LEDs and Connectors



1	Internal hard drive LED	4	USB 0, USB 1 connector
2	External USB Flash LED	5	ASR1000 RP1 LEDs
3	Internal USB bootflash LED		

Figure 2-2 shows the Cisco ASR1000-RP1 with faceplate connectors.

Figure 2-2 Cisco ASR Series 1000 Route Processor Connectors



1	CARRIER LED	4	MGMT Ethernet connector
2	BITS connector	5	CON connector
3	LINK LED	6	AUX connector

Table 2-1 lists the Cisco ASR 1000 Series Route Processor LEDs and behaviors.

Table 2-1 Cisco ASR 1000 Series Route Processor LEDs

LED Label	LED	Color —State	Behavior Description
PWR	Power	Solid green	All power requirements are within specification
		Off	Off, the router is in standby mode.
STAT	System status	Solid green	Cisco IOS software has successfully booted.
		Yellow	BootROM has successfully loaded.
		Red	System failure or during boot process.
ACTV	Active	Green	Lit when the Cisco ASR 1000 Series RP1 is active.
STBY	Standby	Yellow	Lit when the Cisco ASR1000 Series RP1 is the standby processor.
CRIT	Critical	Solid Red	Critical alarm indicator or during boot process. An example: the ambient air temperature is above 60°C and will begin shutdown in 5 minutes.
MAJ	Major	Solid Red	Major alarm indicator. For example: Ambient air temperature is beyond short term operating range of 55°C. System will shut down above 60°C.
MIN	Minor	Amber	Minor alarm indicator. Ambient air temperature is beyond normal operating range of 40°C. For example: if the RP software determines that an unknown card has been installed or if the card has failed, the card can power it off or set a minor alarm.
DISK HD	Internal hard drive LED	Flashing Green	Activity indicator.
		Off	No activity.
DISK USB	External USB Flash LED	Flashing Green	Activity indicator.
		Off	No activity.
DISK BF	Internal USB bootflash LED	Flashing Green	Activity indicator.
		Off	No activity.
CARRIER	LED	Off	Out of service or not configured.
		Solid Green	In frame and working properly.
		Amber	Fault or loop condition exists.
LINK	10/100/1000 RJ-45 Interface LED	Solid Green	Link with no activity.
		Flashing Green	Link with Activity.
		Off	No link.

How the Cisco ASR1000-RP1 Alarm LEDs Work

The Cisco ASR1000-RP1 faceplate displays the CRIT, MAJ, and MIN alarm indicator LEDs. A female DB-25 connector on the power supply faceplate enables you to attach an external alarm monitoring facility to the router. See [Cisco ASR 1006 Router DB-25 Pinout Assignments for Alarm Relays, page A-4](#).

The alarm signals sent to this DB-25 connector are identical in function to those sent to the system LEDs on the Cisco ASR1000-RP1. Each alarm consists of three contact pins that are switched when an alarm becomes active which causes a corresponding contact closure between the DB-25 connector pins.

Thus, a critical, major, or minor alarm condition detected in the router can trigger a simultaneous fault indication in some of the following ways:

- **System alarm LEDs**—The three system alarm LEDs on the Cisco ASR1000-RP1 faceplate constitute the standard method of alarm notification in the router. These LEDs indicate router status at all times, but you must directly observe these LEDs to become aware of a router alarm condition.
- **External alarm monitoring facility**—By equipping your router with a telco-style external alarm monitoring facility, you can provide a more physical indication of router status. A visual alarm, however, can be reset only by resolving the problem that caused the alarm condition.

For example, the same alarm signal that illuminates one of the three system alarm LEDs on the Cisco ASR1000-RP1 faceplate for a critical, major, or minor alarm condition is also sent to the DB-25 connector by means of an associated alarm relay in the Cisco ASR1000-RP1.

An external alarm monitoring facility uses this signal to activate a visible alarm (such as a flashing light) or an audible alarm that immediately alerts site personnel to the existence of a router alarm condition.

An external audible alarm can be reset by clearing the condition that caused the alarm or by pressing the Audible Cutoff (ACO) button on the Cisco ASR1000-RP1. An audible alarm can be sounded to immediately alert you of an alarm condition in the router. An audible alarm generated by the system continues to sound until you either clear the alarm condition itself or press the ACO button to silence the alarm. Pressing this button does not resolve the alarm condition.

[Table 2-2](#) lists the Cisco ASR 1000 Series Route Processors connectors and description.

Table 2-2 Cisco ASR 1000 Series Route Processor Connectors

Label	Type	Description
ACO	Audible Cutoff button	When you press this button, an interrupt is generated informing software that the audible alarm relays will be disabled. This interrupt generates to both processors.
0	USB0 interface	Side-by-side USB connector used with memory sticks or smart cards for secure key distribution
1	USB1 interface	Side-by-side USB connector used with memory sticks or smart cards for secure key distribution
BITS	RJ-45 connector	Indicates BITS timing reference.
MGMT ETHERNET	One RJ-45 jack for copper Ethernet Management Port	The route processor has an ENET port with a RJ-45 connector to attach a management device or network for network management.

Table 2-2 Cisco ASR 1000 Series Route Processor Connectors (continued)

Label	Type	Description
CON	One RJ-45 for CON/AUX	Console port used to connect to a terminal.
AUX	One RJ-45 for CON/AUX	Auxiliary port used for remote management purposes.

The Cisco ASR 1000 Series Route Processor meets the following requirements:

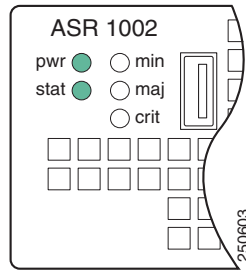
- Supports up to 4GB(bytes) of memory with single-bit error correction and multi-bit error detection except for the built-in RP1 on the Cisco ASR1002 router
- Supports On-board Failure Logging (OBFL) with 2MB of memory
- Supports the Cisco ASR 1000 Series Router system architecture and midplane
- Enhanced Serdes Interconnect (ESI) at 11.5Gbps.
- Gigabit Ethernet switches for EOBC communication and boot-up of the Cisco ASR 1000 Series SPA Interface (SIP) and Cisco ASR 1000 Series Embedded Services Processor.
- Runs Cisco IOS network control plane (routing protocol, connections setup)
- Cisco IOS punt packet forwarding
- Active/Standby Cisco ASR 1000 Series Route Processor 1 and Cisco ASR 1000 Series Embedded Services Processor selection
- Code storage and download operational code to Cisco ASR 1000 Series Embedded Services Processor and Cisco ASR 1000 Series SPA Interface (SIP)
- Bulk storage: by default, it comes with a 40GB hard disk drive (HDD). A 32GB solid state disk drive (SSD optional) can also be configured.
- 2 MB upgradeable BootROM, 1GB embedded USB memory (eUSB), except for the built-in RP1 on the Cisco ASR1002 router.
- Comes with 2GB of DRAM as default and can be upgradeable to 4 GB DRAM.
- Front panel support: Console, 10/100 Management port, two USB ports, CON port, and AUX port.

The two serial ports can run up to 115.2kbps with hardware flow control. One port is used as the CONSOLE port for secure configuration and status display. The default BAUD rate for the CONSOLE port should be set at 9600 BAUD. The console port is an asynchronous serial port; any devices connected to this port must be capable of asynchronous transmission.

The auxiliary port connects a modem or other DCE device (such as a CSU/DSU or other router) to allow remote service and dial backup access to the system. Both the console and auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. The AUX port is a diagnostics access port.

Cisco Embedded ASR1000-RP1 for Cisco ASR 1002 Router

The route processor for the Cisco ASR 1002 Router is integrated in the chassis and supports all the typical customer management interfaces such as the Ethernet network management port and console and auxiliary serial ports of the route processor for the Cisco ASR 1006 and ASR 1004 routers. It also has LED status indicators, an RJ-45 plug for a BITS timing reference and one USB ports which can be used with smart cards for secure key distribution or for image or configuration file updates. [Figure 2-3](#) shows the Cisco ASR1000-RP1 LEDs for the Cisco ASR1002 router.

Figure 2-3 Embedded Cisco ASR1000-RP1 LEDs

The embedded route processors for the Cisco ASR 1002 Router provides connection for one SPA bay and the circuitry for the a built-in 4xGE SPA.

The Cisco route processor for ASR 1002 Router meets the requirements of route processors for the Cisco ASR 1006 and the Cisco ASR 1004 routers; except for the following deviations:

- No SATA hard drive supported. Bulk file storage is on a large fixed eUSB device (up to 8GB (bytes) supported).
- No support for redundant route processors.
- Hardware memory and storage options (such as DRAM) are not field upgradeable.
- Network clock changes. No second BITS clock input supported.
- The LED order is from top to bottom on the route processor is MIN, MAJ, CRIT.

Table 2-3 lists the Cisco embedded ASR1000-RP1 LEDs and behaviors.

Table 2-3 Cisco Embedded ASR1000-RP1 LEDs in the Cisco ASR 1002 Router

LED Label	LED	Color —State	Behavior Description
PWR	Power	Solid green	All power requirements are within specification
		Off	Off, the router is in standby mode.
STAT	System status	Solid green	Cisco IOS has successfully booted.
		Yellow	ROMMON is running or when the Process Manager declares that a critical ASR 1000 Series RP1 process is not running
		Red	System failure or powering up.
MIN	Minor	Amber	Minor alarm indicator.
MAJ	Major	Red	Major alarm indicator.
CRIT	Critical	Red	Critical alarm indicator.
BOOT	eUSB0 FLASH (BootDisk)	Flashing Green	Activity indicator.
		Off	No activity.
CARRIER		Off	Out of service or not configured.
		Green	In frame and working properly.
		Amber	Fault or loop condition.

Table 2-3 Cisco Embedded ASR1000-RP1 LEDs (continued) in the Cisco ASR 1002 Router

LED Label	LED	Color —State	Behavior Description
LINK	10/100 /1000 RJ-45 Interface LED	Green	Link with no activity.
		Flashing Green	Link with activity.
		Off	No link.
4 LEDs	Built-in SPA SFP port status	Off	Port is not enabled.
		Amber	Port enabled but there is a problem with the Ethernet link.
		Green	Port enabled, valid Ethernet link
PWR	Carrier card power	Green	All carrier card requirements are within specification.
STAT	Carrier card status	Green	Only when the SPA drivers have started and are running and all critical processes are running
		Yellow	When ROMMON is running and during the download and boot of the operating system
		Red	A fault is detected or the card is powering up.

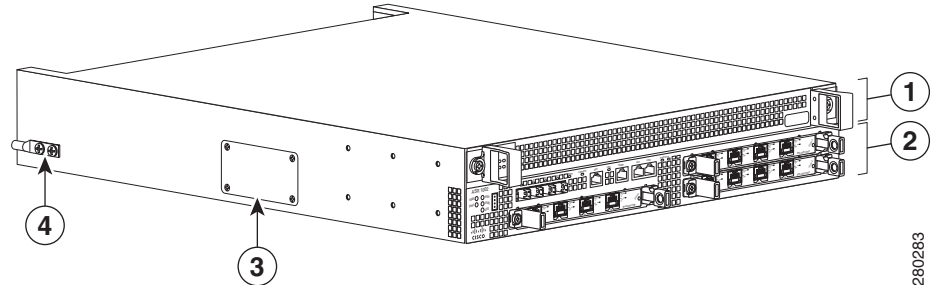
Table 2-4 lists the Cisco embedded ASR1000-RP1 in the Cisco ASR 1002 Router connectors and description.

Table 2-4 Cisco Embedded ASR1000-RP1 Connectors

Label	Type	Description
BITS	Standard E1/T1 RJ-45 connector	Indicates BITS timing references.
MGMT	One RJ-45 jack for copper Ethernet Management Ethernet Port	The route processor has an ENET port with a RJ-45 connector to attach a management device or network for network management.
CON	One RJ-45 for CON	Console port used to connect to a terminal.
AUX	One RJ-45 for AUX	Auxiliary port used for remote management purposes.

Figure 2-4 shows a fully-loaded Cisco ASR 1002 Router.

Figure 2-4 Cisco ASR 1002 Router Route Front View



1	FO slot	3	The eUSB panel door on the side of the Cisco ASR 1002 Router must not be opened. If there is a problem with eUSB flash card, the chassis should be returned.
2	R0 slot	4	Grounding stud

Cisco ASR 1000 Series Embedded Services Processors

The Cisco ASR 1000 Series Embedded Services Processor (ESP) is based on the Cisco QuantumFlow Processor for next-generation forwarding and queuing.

The Cisco ASR 1000 Series ESPs:

- Provide the centralized embedded forwarding services responsible for the bulk of the data plane processing tasks. All network traffic through the Cisco ASR1000 Series system flows through the Cisco ASR 1000 Series Embedded Services Processors.
- Are responsible for the data-plane processing tasks and all network traffic flows through them.
- Support Forwarding Engine Control Processor which provide hardware abstraction layer between the QFP-based forwarding engine and other system components, allowing datapath and management functions to be independent.
- Support Cisco QuantumFlow Processor (QFP) forwarding engines.
- Support QFP provisioned with two TCAM4 devices for ACL lookup and other software features.
- Perform all baseline packet routing operations, including MAC classification, Layer 2 and Layer 3 forwarding, quality-of-service (QoS) classification, policing and shaping, security access control lists (ACLs), VPNs, load balancing, and NetFlow.
- Are responsible for features such as firewalls, intrusion prevention, Network Based Application Recognition (NBAR), Network Address Translation (NAT), and flexible pattern matching.
- Incorporates a security encryption coprocessor to assist encryption processing common to all ESPs. The security processor operates in coprocessor mode and only processes packets sent to it by the Cisco QFP.
- Provide hardware abstraction layer between the packet processing-based forwarding engine and other system components.

The Cisco ASR 1000 Series routers support the following Cisco ASR 1000 Series Embedded Services Processors:

- Cisco ASR1000-ESP5



Note The Cisco ASR1000-ESP5 does not support redundant configurations.

- Cisco ASR1000-ESP10
- Cisco ASR1000-ESP10-N—The Cisco ASR1000 Embedded Services Processor 10G Non Crypto Capable board provides an ASR1000 solution for customers who are under export restrictions and not qualified to implement products that support strong encryption services. The Cisco ASR1000 Embedded Services Processor 10G Non Crypto Capable feature support is the same as the Cisco ASR1000-ESP10 except that SSH, SSL and IPSec VPN services are not supported. For detailed information about this feature, refer to the [Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide](#) and the [Cisco ASR 1000 Embedded Services Processor 10G Non Crypto Capable Feature Guide](#).
- Cisco ASR1000-ESP20



Note

Upgrading from a Cisco ESP to another Cisco ESP can be performed on redundant ESP systems only (Cisco ASR1006 and Cisco ASR1004 routers). The Cisco ASR1002 router supports only one Cisco ASR1000-ESP5 or ASR1000-ESP10. The Cisco ASR1006 and Cisco ASR1004 routers do not support the Cisco ASR1000-ESP5. Therefore, when performing upgrades, the Cisco ASR1000-ESP10, Cisco ASR1000-ESP20, and any future ESPs can be upgraded.



Note


Do not have different embedded services processors operating in the same chassis. The only time this condition occurs is when you are performing an upgrade.

The Cisco ASR 1000 Series Embedded Services Processors consist of three main elements:

- Cisco QuantumFlow Processor for packet processing and queueing and scheduling
- Data plane interconnect
- Forwarding Engine Control Processor (FECF) (located on the Cisco ASR Series Embedded Services Processor)

All initial Cisco ASR 1000 Series Embedded Services Processors are based on a common highly-programmable network Cisco QuantumFlow Processor (packet processing).

Table 2-5 *Differences in Cisco ASR1000 Embedded Services Processors*

Feature	Cisco ASR1000-ESP5	Cisco ASR1000-ESP10	Cisco ASR1000-ESP20
Memory	256MB Cisco QuantumFlow Processor, 10Mb TCAM, 64MB packet buffer, and 1GB FECF DRAM	512MB Cisco QuantumFlow Processor, 10Mb TCAM, and 128MB packet buffer, and 2GB FECF DRAM	1GB Cisco QuantumFlow Processor, 40Mb TCAM, 256MB packet buffer, 4GB FECF DRAM
Performance	4 Mpps for the combination of the following commonly-used features: IPv4 forwarding, IP Multicast, ACL, QoS, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow	8 Mpps forwarding for the combination of the following commonly-used features: IPv4 forwarding, IP Multicast, ACL, QoS, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow	16 Mpps forwarding for the combination of the following commonly-used features: IPv4 forwarding, IP Multicast, ACL, QoS, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow
Bandwidth	5Gbps of bandwidth	10Gbps of bandwidth	20Gbps of bandwidth
Security Traffic Performance	1Gbps	3 Gbps	8Gbps
Product Compatibility	Located in slot 1 and is labeled F0 in the Cisco ASR 1002 Router only	Located in: <ul style="list-style-type: none"> • Cisco ASR 1006 Router physical slots 3 and 4 and are labeled F0 and F1. • Cisco ASR 1004 Router physical slot 1 and is labeled F0. • Cisco ASR 1002 Router physical slot 1 (top slot) and is labeled F0. 	Located in: <ul style="list-style-type: none"> • Cisco ASR 1006 Router physical slots 3 and 4 and are labeled F0 and F1. • Cisco ASR 1004 Router physical slot 1 and is labeled F0. <div>  Note The Cisco ASR 1002 Router does not support the Cisco ASR1000-ESP20. </div>

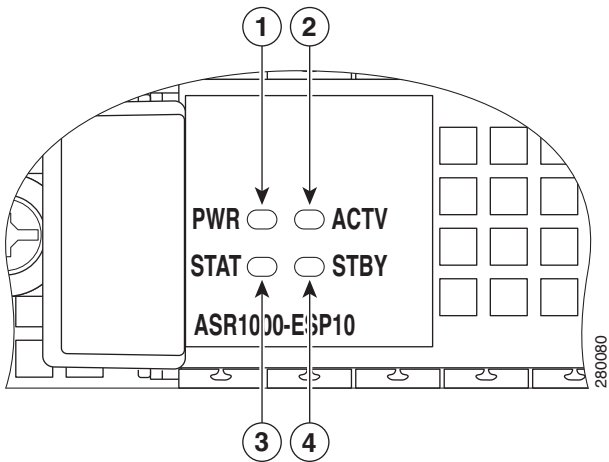
The Cisco ASR 1000 Series Embedded Services Processor (ESP) consists of a front panel label for indicator and control functions. The Cisco ASR 1000 Series Embedded Services Processor model number labeling is located next to the left card module handle. The module also contains card handles to assist in insertion or removal of the module.

Figure 2-5 shows the Cisco ASR 1000 Series Embedded Services Processor LEDs on the front panel.

**Note**

The Cisco ASR 1000 Series embedded services processors have the same faceplate and status information except for the name label, such as Cisco ASR1000-ESP20, Cisco ASR1000-ESP10, Cisco ASR1000-ESP10-N, or Cisco ASR1000-ESP5.

Figure 2-5
 Cisco ASR1000-ESP10 Faceplate LEDs



1	PWR—Power LED	3	STAT—Status LED
2	ACTV—Active LED	4	STBY—Standby LED

Table 2-6 lists the Cisco ASR1000-ESP5, ASR1000-ESP10, and ASR1000-ESP20 LEDs and behaviors.

Table 2-6
 Cisco ASR1000 ESP LEDs for the Cisco ASR 1000 Series Routers

LED Label	LED	Color	Behavior Description
PWR	Power	Solid green	All power requirements are within specification
		Off	The ESP is not powered on.
STAT	System status	Solid green	Cisco IOS has successfully booted.
		Yellow	ROMMON is running or when the Process Manager declares that a critical ASR 1000 Series RP1 process is not running
		Red	System failure or powering up.
ACTV	Active	Green	The ACTV LED indicates (in a redundant system) which ESP board is actively forwarding packets The active ESP board will have a green ACTV LED and the STBY LED will be off. The standby ESP board will have a yellow STBY LED and the ACTV LED will be off. Note that in a ASR1002 or ASR1004 chassis, any ESP board will always be active since these chassis does not support redundancy. The ASR1000-ESP5 does not support redundancy, therefore it will always be active.
STBY	Standby	Yellow	The STBY LED indicates (in a redundant system) which ESP board is in a standby mode waiting to take over packet forwarding in case the active ESP board experiences a failure. Will always be off if active Cisco ASR1000-ESP is on.

Cisco ASR 1000 Series SPA Interface Processor

This section describes the SPA interface processor for the Cisco ASR 1006 and Cisco ASR 1004 routers and the Cisco embedded ASR1000-SIP10 for the Cisco ASR 1002 Router.

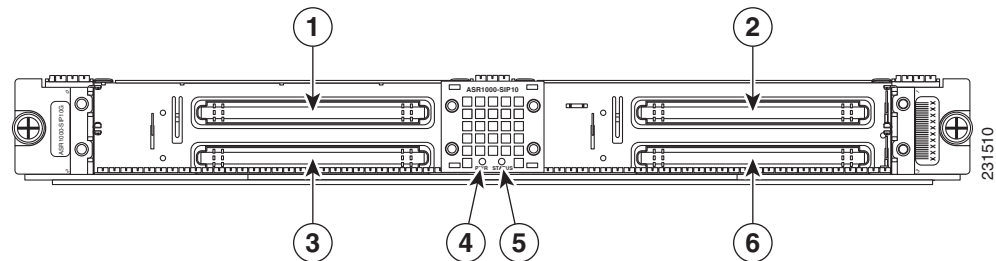
The Cisco ASR 1000 Series SPA Interface Processor for the Cisco ASR 1006 and Cisco ASR 1004 routers:

- Is a carrier card that inserts into a router slot like a line card.
- Contains one or more subslots which house one or more shared port adapters.
- Supports online insertion and removal (OIR) with SPAs inserted in the subslots. SPAs also support OIR and can be inserted or removed independently from the SIP.

This section describes the Cisco ASR 1000 Series SPA Interface (SIP) components and subslot identification.

Figure 2-6 shows the Cisco ASR 1000 Series SPA Interface (SIP) module.

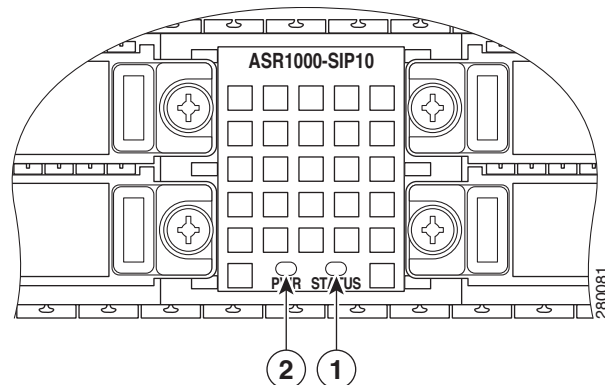
Figure 2-6 Cisco ASR 1000 Series SPA Interface Processor Faceplate



1	SPA subslot 0	4	STATUS Led
2	SPA subslot 1	5	PWR Led
3	SPA subslot 2	6	SPA subslot 3

Figure 2-7 shows the LEDs on the Cisco ASR1000-SIP 10.

Figure 2-7 Cisco ASR1000-SIP10 SPA Interface Processor



1	STATUS LED	2	PWR LED
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Table 2-7 describes the Cisco ASR 1000 Series SIP10 LEDs on the front panel.

Table 2-7 Cisco ASR1000-SIP10 LEDs

LED Label	LED	Color—State	Behavior Description
PWR	Power	Solid green	Cisco ASR 1000 Series SIP is powered on
		Off	Cisco ASR 1000 Series SIP is powered off
STATUS	System status	Solid green	The Cisco ASR 1000 Series SPA Interface Processor has encountered an error
		Yellow	Lit when the Cisco ASR 1000 Series SIP is loading
		Red	The SPA drivers have started and are running and all critical processes are running (as determined by the Cisco ASR 1000 Series SPA Interface (SIP) Process Manager).

The Cisco ASR1002-SIP10 supports a built-in 4xGE SPA and three half-height SPAs (one half-height and one full height SPA). The Cisco ASR1002-SIP10 also functions as the base board for the Cisco embedded ASR1000-RP1. The Cisco 1002 Router has one slot for FP0 with three subslots for SPAs, subslots 1 - 3.

Shared Port Adapters

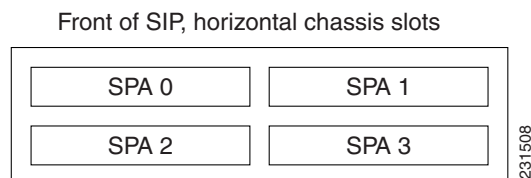
A shared port adapter is a modular type of port adapter that inserts into a subslot of a compatible SIP to provide network connectivity and increased interface port density. The Cisco ASR 1000 Series SPA Interface Processor (SIP) provides an aggregation function for SPAs.

In the Cisco ASR 1006 Router, the Cisco ASR1000 Series SIP supports:

- 4 half-height (HH) (¼ rate or full rate or combination)
- 2 full-height (FH) (¼ rate or full rate or combination) SPAs with up to 32 ports per SPA
- 2 half-height and 1 full-height combination that does not exceed 64 ports

Figure 2-8 shows the slot numbering for the shared port adapters on the Cisco ASR 1000 Series SPA Interface for the Cisco ASR 1006 Router and Cisco ASR 1004 Router.

Figure 2-8 Cisco ASR1000 Series SPA Interface Subslot Numbering



In the Cisco ASR 1004 Router, the Cisco ASR1000 Series SIP supports:

- Four half height (¼ rate or full rate or combination)

- Two full height (¼ rate or full rate or combination) SPAs with up to 32 ports per SPA

The slot numbering for the SPAs in the Cisco ASR 1004 Router is the same as in the Cisco ASR 1006 Router.

In the Cisco ASR 1002 Router, the Cisco ASR1002-SIP10 supports:

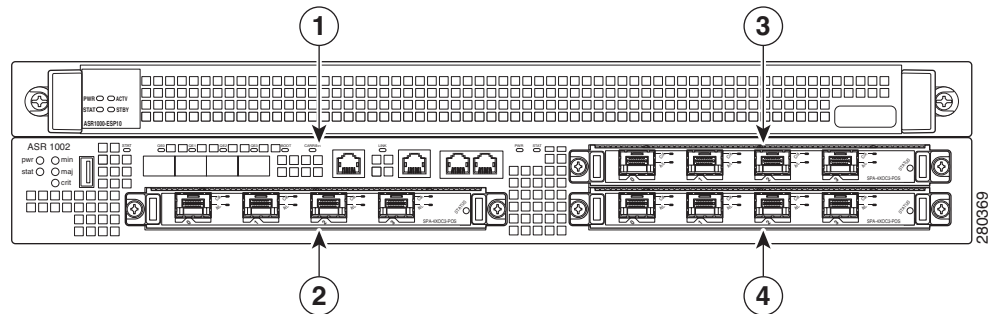
- Three removable half height SPAs on Bay 1, 2, and 3
- The fourth SPA which is a built-in 4xGE SPA on Bay 0 located on the Cisco ASR 1000 Series RP1

**Note**

The shared port adapters on the Cisco ASR1002-SIP10 support online insertion and removal. However, the Cisco ASR1002-SIP10 in the Cisco ASR 1002 Router is built into the chassis and is not a field-replaceable unit and does not support online insertion and removal.

Figure 2-9 shows the slot numbering for the shared port adapters on the Cisco ASR 1000 Series SPA Interface for the Cisco ASR 1002 Router.

Figure 2-9 Cisco ASR1002-SIP10 Interface Subslot Numbering



1	Cisco embedded ASR1000-RP1 subslot 0	3	SPA subslot 1
2	SPA subslot 2	4	SPA subslot 3

The Cisco embedded ASR1000-SIP10 (in the Cisco ASR 1002 Router) supports one built-in 4xGE SPA and three half height SPAs in any one of the following configurations:

- Built-in 4xGE SPA in bay 0 and three half height SPAs in bay 1, 2, 3.
- Built-in 4xGE SPA in bay 0, one half height SPA in bay 2, and one full height SPA in bay 1.

The Cisco ASR 1000 Series SPA interface processor houses SPA bay 2 and SPA bay 3. SPA bay 0 and SPA bay 1 are physically located on Cisco embedded ASR1000-RP1. A portion of the Cisco embedded ASR1000-RP1 is reserved to provide connectivity between SPA bay 1 and the Cisco embedded ASR1000-SIP10.

**Note**

The embedded Cisco ASR1000-RP1 subslot 1 must communicate to subslot 3 of the embedded SIP when running a full height SPA in subslot 1.

For information about specifying SIP subslot location for a SPA and specifying slot location for a SIP, see the [Cisco Aggregation Services Router 1000 Series SIP and SPA Installation Guide](#).

Cisco ASR 1000 Series Router Power Supplies

All Cisco ASR 1000 Series Router configurations support AC and DC power supply options. The modular chassis configurations support the installation of two power supplies for redundancy. When an external power supply fails or is removed, the other power supply provides power requirements for the chassis.

You are required to always have two power supplies installed in the chassis to insure sufficient cooling for the box. The system fans are inside the power supply unit and must spin for cooling. No Cisco ASR 1000 Series Router will operate for more than five minutes without two power supplies installed. Since all the system fans can be powered by one power supply, it is not required for the second power supply unit to be powered on, but it must be installed. Cisco IOS software specifically looks for two power supplies in the chassis and will automatically initiate a shutdown if only one power supply is detected.

This section contains the following topics:

- [Power Supply Requirements for All Cisco ASR 1000 Series Routers, page 2-16](#)
- [Power Supplies for Cisco ASR 1006 Router, page 2-18](#)
- [Power Supplies for Cisco ASR 1004 Router, page 2-23](#)
- [Power Supplies for Cisco ASR 1002 Router, page 2-28](#)

Power Supply Requirements for All Cisco ASR 1000 Series Routers

This section contains power supply specifications for the Cisco ASR 1006, ASR 1004, and ASR 1002 routers. The following topics are covered:

- DC power supply input ratings and circuit breaker specifications
 - Maximum and minimum Amps for the branch circuit breakers
 - Maximum and minimum size of the AWG wire required for each circuit breaker.
- AC and DC power supply types
- AC and DC power supply ratings

DC Power System Input Requirements for Cisco ASR 1000 Series Routers

The DC power supply for the Cisco ASR 1006, ASR 1004, and ASR 1002 routers operate at specifications. shows the common input ranges and circuit breaker requirements.

Table 2-8 Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps		AWG # Wire	
		Minimum	Maximum	Minimum	Maximum
Cisco ASR 1006	40	Always 50		Always AWG #6 wire	
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20Amp circuit breaker and an AWG #10 gauge wire for a 30Amp circuit breaker.



Note

All Cisco ASR 1000 Series Router AC power supplies require a 20 AMP circuit breaker.

AC and DC Power Supply Types

The AC and DC power supplies for the Cisco ASR 1000 Series Routers support different types of power supply switches. [Table 2-9](#) defines which power supplies the Cisco ASR 1000 Series routers support (a Standby or an On/Off switch).

Table 2-9 Cisco ASR 1000 Series Routers AC and DC Power Supply Switches

Switch Type Supported	Symbol	Cisco ASR 1000 Series Router Power Supply
On/Off circuit	I/O	ASR 1006 DC ASR 1004 DC ASR 1002 AC
Standby switch	A broken circle with a vertical line through the top of it	ASR 1006 AC ASR 1004 AC ASR 1002 DC

AC and DC System Power Ratings

[Table 2-10](#) lists AC and DC power supply system rating requirements for all Cisco ASR 1000 Series Routers.

Table 2-10 AC and DC Power Supply System Rating Specifications for the Cisco ASR 1000 Series Routers

Description	Specification
Power supply declared ratings	AC = 100-240 VAC DC = -48/ -60 VDC
Nominal line frequency rating	50/60 Hz

Power Supplies for Cisco ASR 1006 Router

The Cisco ASR 1006 Router can support up to 1200W output (AC and DC input). The 1200W power supply module consists of either an AC or DC input and 1200 watt output closed frame power supply with two DC voltage outputs: 12V and 3.3V.

Each power supply module contains three internal fan modules and provides the forced air cooling for the chassis. These power supply modules contain a monitor circuit to determine the status of fan speed and operation along with LED status indicating fan errors.

The system temperature operation is 0 to 40C normal and -5C to +55C.

- **AC System**—AC power input is an IEC 320-type power inlet, 20A service connector. The AC input side contains a front panel with provisions for mounting screw, built in handle to extract the power supply, three status LEDs, and fans for power supply and system cooling.
- **DC System**—Two-position terminal block-style connector, with labeled connections for - (-48/60 V input) and + (-48/60 V Return). The DC input side contains a front panel with provisions for mounting screw, built in handle to extract the power supply, three status LEDs, and fans for power supply and system cooling.

See [Appendix A, “Cisco ASR 1000 Series Routers Specifications.”](#) for detailed power supply specifications.



Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies for the Cisco Aggregation Services Routers: 120 VAC, 20A U.S. maximum. DC power supplies for the Cisco ASR 1006 Router: 50A U.S. maximum; Cisco ASR 1004 Router: 40A U.S. maximum; Cisco ASR 1002 Router: 30A U.S. maximum.
Statement 1005

AC Power Supply LEDs and Connector for Cisco ASR 1006

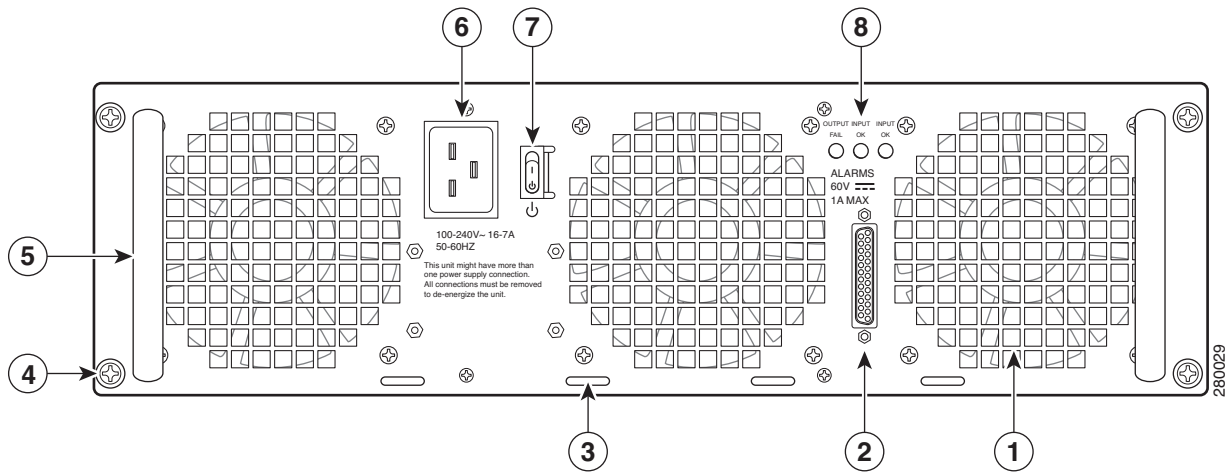
This section provides information about the AC power supplies on the rear of the Cisco ASR 1006 Router. The power supply module contains three fans mounted in the power supply module. A total of six fans are used to cool the ASR 1006 system and power supply. The airflow direction is front to back.

Power supply modules with internal fan modules install into the rear of the chassis. These modules contain integral handles to ease installation and removal (no insertion or extraction levers are provided). A single blind mate connector located on the inlet side of these modules mates with a connector mounted on back side of the midplane.

Guide pins located at the rear of these modules help center locate the modules and reduce stress to the midplane and module mounted connectors. Four captive screws (tool operated latches) are provided on the modules face plate (chassis rear) to secure these modules into the chassis.

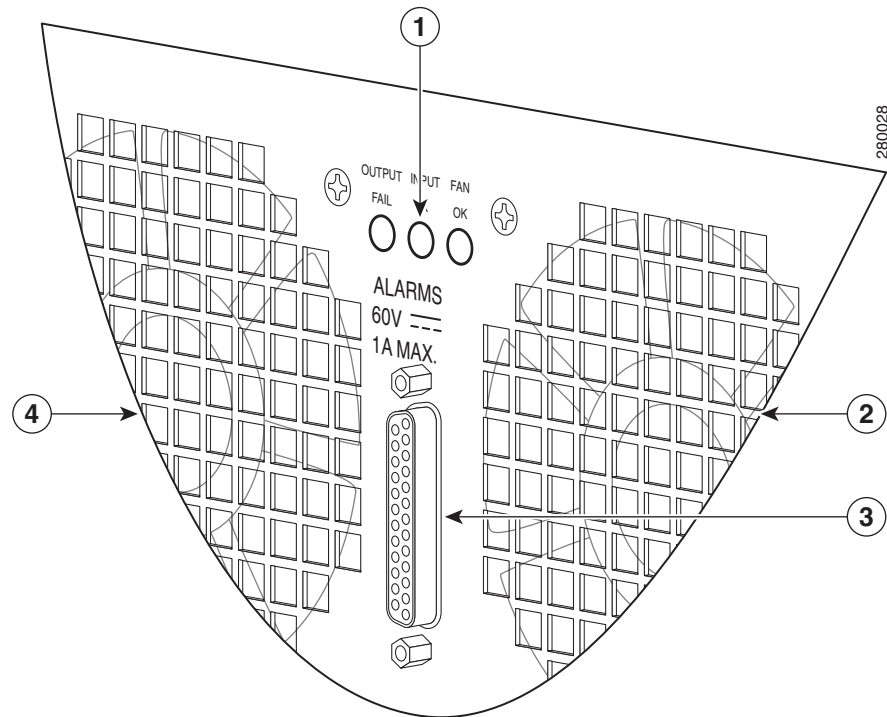
Figure 2-10 shows the AC power supplies at the rear of the Cisco ASR 1006 Router. The Cisco ASR 1006 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in Table 2-11.

Figure 2-10 Cisco ASR 1006 Router AC Power Supply



1	AC power supply fan	5	AC power supply handle
2	DB-25 alarm connector	6	AC power inlet
3	Tie-wrap tab	7	AC power supply Standby switch
4	AC power supply captive screw	8	AC power supply LEDs

Figure 2-11 shows the AC power supplies LEDs and DB-25 Alarm connector.

Figure 2-11 Cisco ASR 1006 Router AC Power Supply LEDs and DB-25 Alarm Connector

1	AC power supply LEDs	3	DB-25 alarm connector
2	AC power supply fan	4	AC power supply fan

Table 2-11 describes the AC power supply LEDs on the Cisco ASR 1006 Router.

Table 2-11 Cisco ASR 1006 Router AC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	Power supply activity	Green	LED illuminates green to signal that the AC power supply input voltage is greater than 85V.
		None	If LED is not illuminated, then the AC input voltage is less than 70V or the power supply is turned off. For an AC input voltage between 70V and 85V, the INPUT OK LED can be either on, off, or flashing

LED Label	LED	Color	Description
FAN OK	Bi-color LED indicates fan status	Green	LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	LED is red and turned off to signal that the DC output voltages are within the normal operating range; output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an output fail alarm. When you turn the power supply on, the red LED is illuminated for two to three seconds for testing LED operation before going off.

DC Power Supply LEDs and Connectors for Cisco ASR 1006

This section provides information about the DC power supplies on the rear of the Cisco ASR 1006 Router. The maximum branch circuit for the DC power supply module is 60A and the minimum is 50A.

The DC power supply operates within specification from –48 VDC to –60 VDC continuously. The Cisco ASR 1006 Router has two of the same type power supplies in power supply slot 0 and power supply slot 1. The power supply slot numbers are on the left side of the chassis and the power supplies are located on the floor of the chassis.

The DC input connector is a terminal block style that supports a AWG #6 wire. The terminal block is compliant to all safety agencies and electrical requirements of the supply. Use the tie wraps to dress the input cable wires. There are three tie wrap tabs on the power supply.

The terminal block accepts two double-hole lugs, one for –48V input and another for –48V RTN. A plastic cover fits over the terminal block to prevent accidental contact. See [Figure 5-19](#).

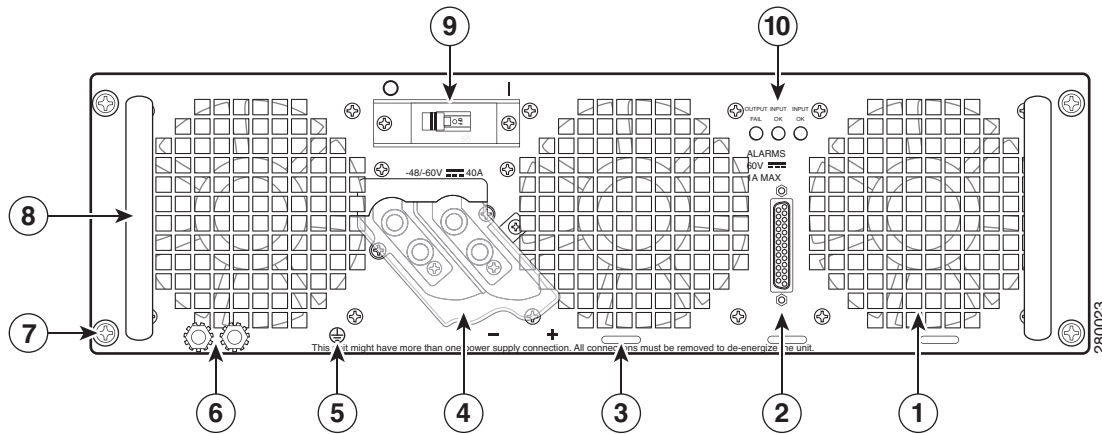


Note

The studs on the terminal block are similar to the safety ground device on the side of the Cisco ASR 1006 Router. For information on the safety ground lug on the side of the chassis.

The unit requires a power switch circuit breaker to serve as the main disconnect for the DC input to the power supply. The circuit breaker meets international safety requirements and supports 80 VDC and has a current rating of 50 A. The power supply unit is secured into the system chassis with four captive screws mounted on the faceplate.

[Figure 2-12](#) shows the DC power supplies at the rear of the Cisco ASR 1006 Router. The Cisco ASR 1006 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in the [Table 2-12](#).

Figure 2-12 Cisco ASR 1006 Router DC Power Supply

1	Fans	6	DC Power supply earth ground lugs
2	DB-25 alarm connector	7	DC Power supply captive screws
3	Tie-wrap tabs	8	DC Power supply handle
4	DC power supply terminal and plastic cover	9	DC power supply On (I) /Off (O) switch
5	Earth grounding symbol	10	DC power supply LEDs

Table 2-12 describes the LEDs on the Cisco ASR 1006 Router DC power supply.

Table 2-12 Cisco ASR 1006 Router DC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	A bi-color LED indicates presence of input voltage	Green	LED illuminates green to signal that the DC power supply input voltage is greater than -43.5VDC at turn-on and remains green down to -39VDC.
		Amber	The LED illuminates amber when the input voltage (falls below -39VDC) and indicates that there is still a voltage present (voltage on the terminal block). The LED remains amber and is active to around 20V +/-5V. The LED is not illuminated if the input is below -15V.
FAN OK	A bi-color LED indicates power supply fan status	Green	The LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	When the LED is off, it signals that the DC output voltage are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an Output Fail alarm. When you turn the power supply on, the red LED illuminates for two to three seconds to test LED operation before going off.

AC/DC Power System Output for Cisco ASR 1006

The power supply output tolerance is defined in [Table 2-13](#) under all combinations of line variation. Total system consumption per power supply should not exceed 1200 W.

Table 2-13 Cisco ASR 1006 Router Power System Output Voltage and Current

Output Voltage	+12 VDC	+3.3 V
Minimum	11.80 VDC	3.20 VDC
Nominal	12.00 VDC	3.30 VDC
Maximum	12.20 VDC	3.40 VDC
Output Current		
Minimum	2.80 A	0.10 A
Maximum	101.7 A	3.125 A

Power Supplies for Cisco ASR 1004 Router

The Cisco ASR 1004 Router can support up to 735 W output (AC and DC input). The 735W power supply module consists of either an AC or DC input with two DC voltage outputs: 12V and 3.3V.

Each power supply module contains three internal fan modules and provides the forced air cooling for the chassis. These power supply modules contain a monitor circuit to determine the status of fan speed and operation along with LED status indicating fan errors.

The system temperature operation is 0 to 40C and –5C to +55C.

- **AC System**—AC power input is an IEC 320-type power inlet, 15A service connector. The AC input side contains a front panel with provisions for mounting screw, built in handle to remove the power supply, three status LEDs, and fans for power supply and system cooling.
- **DC System**—Three-position terminal block-style connector, with labeled connections for - (–48/60 V input) and + (–48/60 V Return) and GND (earth ground symbol). The DC input side contains a front panel with provisions for mounting screw, built in handle to extract the power supply, three status LEDs, and fans for power supply and system cooling.

See [Appendix A, “Cisco ASR 1000 Series Routers Specifications.”](#) for detailed power supply specifications.



Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies for the Cisco Aggregation Services Routers: 120 VAC, 20A U.S. maximum. DC power supplies for the Cisco ASR 1006 Router: 50A U.S. maximum; Cisco ASR 1004 Router: 40A U.S. maximum; Cisco ASR 1002 Router: 30A U.S. maximum.
Statement 1005

Cisco ASR 1004 AC Power Supply

This section provides information about the AC power supplies on the rear of the Cisco ASR 1004 Router. The power supply module contains three fans mounted in the power supply module. A total of six fans are used to cool the ASR 1004 system and power supply. The airflow direction is front to back.

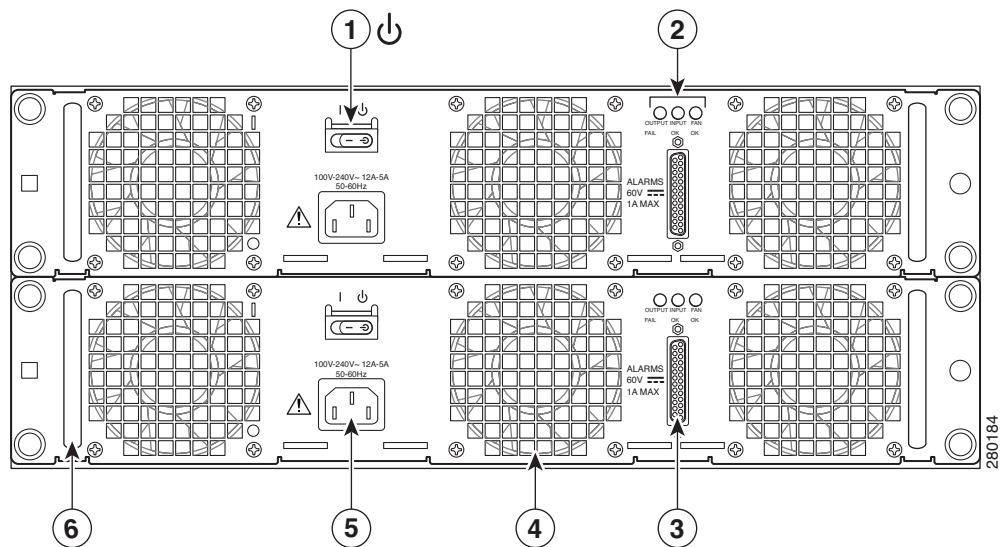
Power supply modules with internal fan modules install into the rear of the chassis. These modules contain handles to ease installation and removal. The AC power supply has a front panel mounted switch that powers on and off the power supply. This switch will not disconnect the AC line, but will act only as a standby switch to the power supply. The front panel includes a mechanical guard to prevent the standby switch from being tripped due to accidental contact.

Guide pins located at the rear of these modules help center locate the modules and reduce stress to the midplane and module mounted connectors. Four captive screws (tool operated latches) are provided on the modules face plate (chassis rear) to secure these modules into the chassis.

Cisco ASR 1004 AC Power Supply LEDs and Connector

Figure 2-13 shows the AC power supplies at the rear of the Cisco ASR 1004 Router. The Cisco ASR 1004 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in Table 2-14.

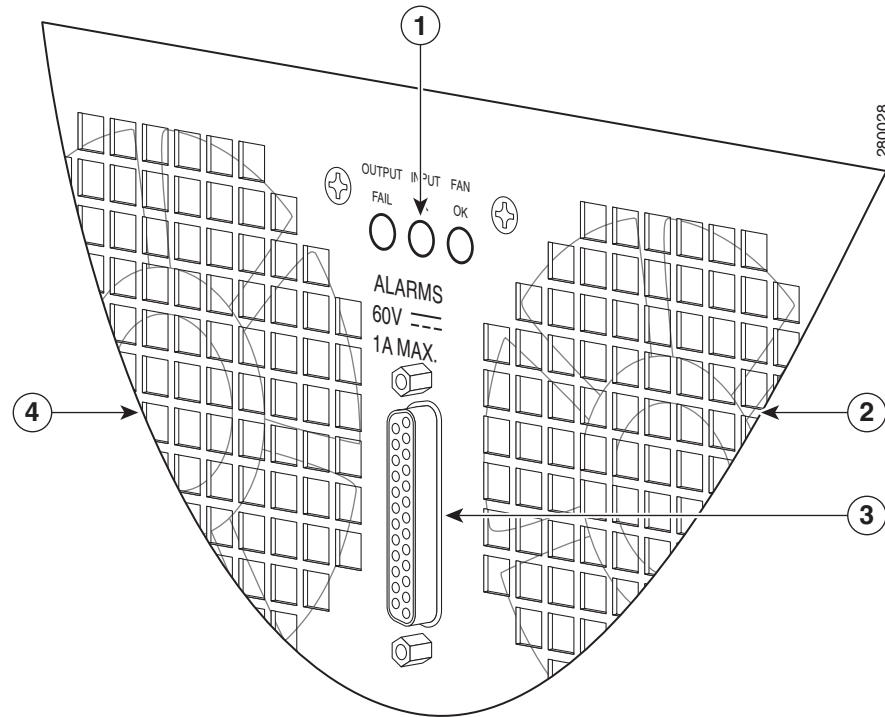
Figure 2-13 Cisco ASR 1004 Router AC Power Supply



1	AC power supply Standby switch (standby symbol is a broken circle with a vertical line through the top of it)	4	AC power supply fan
2	AC power supply LEDs	5	AC power inlet
3	DB-25 alarm connector	6	AC power supply handle

Figure 2-14 shows the AC power supplies LEDs and DB connector.

Figure 2-14 Cisco ASR 1004 Router AC Power Supply LEDs and DB -25 Alarm Connector



1	AC power supply LEDs	3	DB-25 alarm connector
2	Power supply fan	4	AC power supply fan

Table 2-14 describes the AC power supply LEDs on the Cisco ASR 1004 Router.

Table 2-14 Cisco ASR 1004 Router AC Power Supply LEDs and Connector

LED Label	LED	Color	Description
INPUT OK	Power supply activity	Green	LED illuminates green to signal that the AC power supply input voltage is greater than 85V.
		None	If LED is not illuminated, then the AC input voltage is less than 70V or the power supply is turned off. For an AC input voltage between 70V and 85V, the INPUT OK LED can be either on, off, or flashing

LED Label	LED	Color	Description
FAN OK	Bi-color LED indicates fan status	Green	LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	LED is red and turned off to signal that the DC output voltages are within the normal operating range; output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an output fail alarm. When you turn the power supply on, the red LED is illuminated for two to three seconds for testing LED operation before going off.

Cisco ASR Router 1004 DC Power Supply

This section provides information about the DC power supplies on the rear of the Cisco ASR 1004 Router. For the maximum branch circuit for the DC power supply module, see [Table 2-8](#).

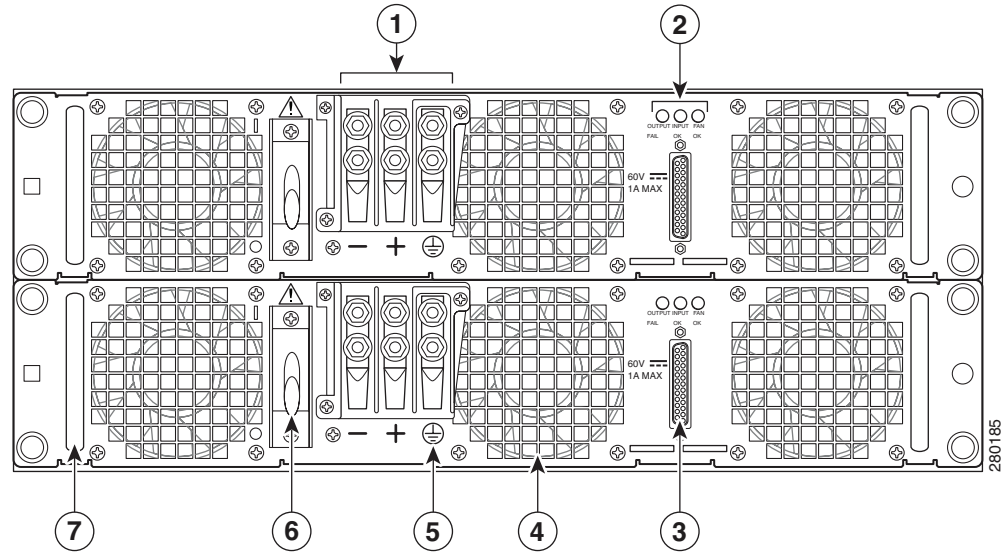
The DC power supply operates within specification from –48 VDC to –60 VDC continuously. The Cisco ASR 1004 Router has two of the same type power supplies in power supply slot 0 and power supply slot 1. The power supply slot numbers are on the left side of the chassis and the power supplies are located on the floor of the chassis.

The DC power supply input connector is a terminal block style that will allow crimp type lugs accepting up to AWG #8 wire. The terminal block is compliant to all safety agencies and electrical requirements of the supply. The terminal block accepts two-hole lugs (#10 stud) for all connections with center to center spacing of 0.625 inches. A plastic cover goes over the terminal block to prevent accidental contact. The connection order shall be negative (–), positive (+), and GND terminals.

The unit requires a power switch circuit breaker to serve as the main disconnect for the DC input to the power supply ([Table 2-8](#) see for current rating requirements.) The power supply unit is secured into the system chassis with four captive screws mounted on the faceplate.

Cisco ASR 1004 Router DC Power Supply LEDs and Connector

[Figure 2-15](#) shows the DC power supplies at the rear of the Cisco ASR 1004 Router. The Cisco ASR 1004 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in the [Table 2-15](#).

Figure 2-15 Cisco ASR 1004 Router DC Power Supply

1	DC power supply terminal and plastic cover	5	Earth grounding symbol
2	DC power supply LEDs	6	DC power supply On (I) /Off (O) switch
3	DB-25 alarm connector Power supply ground lugs (+ and -)	7	DC power supply handle
4	DC power supply fan		

Table 2-15 describes the LEDs on the Cisco ASR 1004 Router DC power supply.

Table 2-15 Cisco ASR 1004 Router DC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	A bi-color LED indicates presence of input voltage	Green	LED illuminates green to signal that the DC power supply input voltage is greater than -43.5VDC at turn-on and remains green down to -39VDC.
		Amber	The LED illuminates amber when the input voltage (falls below -39VDC) and indicates that there is still a voltage present (voltage on the terminal block). The LED remains amber and is active to around 20V +/-5V. The LED is not illuminated if the input is below -15V.

LED Label	LED	Color	Description
FAN OK	A bi-color LED indicates power supply fan status	Green	The LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	<p>When the LED is off, it signals that the DC output voltage are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an Output Fail alarm.</p> <p>When you turn the power supply on, the red LED illuminates for two to three seconds to test LED operation before going off.</p>

DC Power System Input for Cisco ASR 1004

The DC power supply operates within specification from -40.5VDC to -72VDC continuously once the the power supply DC input turn on threshold of -43.5V has been reached. [Table 2-21](#) shows the common input ranges for *reference* only.

Table 2-16 Cisco ASR 1004 Router DC Power System Input

Voltage Range (VDC)	Minimum	Nominal	Maximum
Domestic	-40.5	-48	-56
International	-55	-60	-72

AC/DC Power System Output for Cisco ASR 1004

The power supply output tolerance is defined in [Table 2-17](#) under all combinations of line variation. Total system consumption per power supply should not exceed 735 W.

Table 2-17 Cisco ASR 1004 Router Power System Output Voltage and Current

Output Voltage	+12 VDC	+3.3 V
Minimum	11.80 VDC	3.20 VDC
Nominal	12.00 VDC	3.30 VDC
Maximum	12.20 VDC	3.40 VDC
Output Current		
Minimum	2.80 A	0.10 A
Maximum	61.44A	3.125 A

Power Supplies for Cisco ASR 1002 Router

The Cisco ASR 1002 Router supports an AC or DC power supply:

- [Cisco ASR 1002 Router AC Power Supply, page 2-29](#)—The AC power supply operates between 85VAC and 264VAC. AC power input is an IEC 320-type power inlet, 15A service connector. The AC input side contains a front panel with provisions for mounting screw, two built-in handles to extract the power supply, three status LEDs, and fans for power supply and system cooling.

- [Cisco ASR 1002 Router DC Power Supply, page 2-31](#)—The DC power supply operates between –40.5VDC and –72VDC. Three-position euro-style terminal block, with labeled connections for – (–48/60 V input) and + (–48/60 V Return) and the GND symbol for grounding. The DC input side contains a front panel with provisions for mounting screw, built in handles to remove the power supply, three status LEDs, and fans for power supply and system cooling.

Cisco ASR 1002 Router Power Supply Fans

Cisco ASR 1002 Router system level cooling is provided by two 12 VDC type fans in each power supply module. The fans in each module provide system cooling back-up in the event of a single fan failure. In addition, the fans in each of the power supplies can be powered from a single supply when only one unit is operational. The airflow direction is front to back.



This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies for the Cisco Aggregation Services Routers: 120 VAC, 20A U.S. maximum. DC power supplies for the Cisco ASR 1006 Router: 50A U.S. maximum; Cisco ASR 1004 Router: 40A U.S. maximum; Cisco ASR 1002 Router: 30A U.S. maximum.
Statement 1005

Cisco ASR 1002 Router AC Power Supply

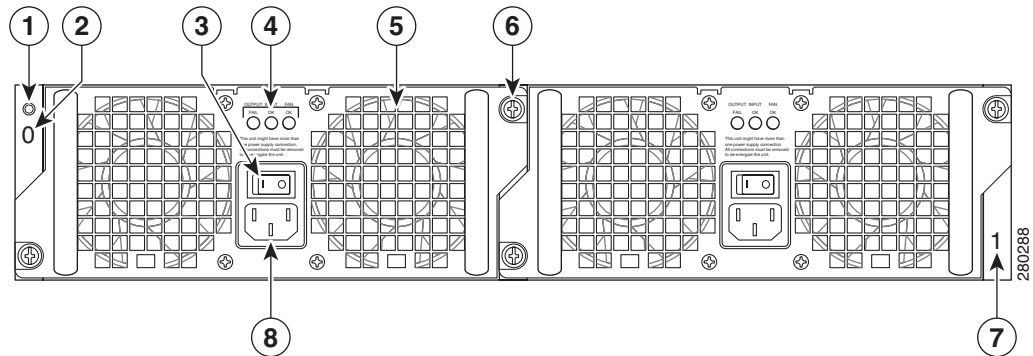
This section provides information about the AC power supplies on the rear of the Cisco ASR 1002 Router.

The Cisco ASR 1002 Router system level cooling is provided by two 12 VDC type fans in each of the two power supply modules. The fans in each module are intended to provide system cooling back-up in the event of a single fan failure. In addition, the fans in each of the power supplies can be powered from a single supply when only one unit is operational. The airflow direction is front to back. The power supplies plug directly into the Cisco ASR1000-RP1 and distributes power back to the midplane.

Guide pins located at the rear of these modules help center locate the modules and reduce stress to the midplane and module mounted connectors. Two captive screws (tool operated latches) are provided on the modules face plate (chassis rear) to secure these modules into the chassis.

Cisco ASR 1002 AC Power Supply LEDs and Connector

[Figure 2-16](#) shows the AC power supplies at the rear of the Cisco ASR 1002 Router. The Cisco ASR 1002 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in [Table 2-11](#).

Figure 2-16 Cisco ASR 1002 Router AC Power Supply

1	Chassis ESD socket	5	AC power supply fan
2	AC power supply slot number 0	6	AC power supply captive installation screw
3	AC power supply On (I) /Off (O) switch	7	AC power supply slot number 1
4	AC power supply LEDs	8	AC power inlet

Table 2-18 describes the AC power supply LEDs on the Cisco ASR 1002 Router.

Table 2-18 Cisco ASR 1002 Router Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	Power supply activity	Green	LED illuminates green to signal that the power supply input voltage is greater than 85V.
		None	If LED is not illuminated, then the input voltage is less than 70V or the power supply is turned off. For an AC input voltage between 70V and 85V, the INPUT OK LED can be either on, off, or flashing
FAN OK	Bi-color LED indicates fan status	Green	LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	LED is red and turned off to signal that the DC output voltages are within the normal operating range; output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an output fail alarm.

AC Power System Output Voltage Alarm Range for Cisco ASR 1002

The AC power supply output voltage alarm occurs when the output voltage is below the low end of the minimum or above the high end of the maximum limits shown in [Table 2-19](#).

Table 2-19 Cisco ASR 1002 Router AC Power Supply Output Voltage Alarm Range

	Minimum	Maximum
12 V	10.0 to 11.2V	12.8 to 13.8 V
3.3 V	2.6 to 3.0V	None

Cisco ASR 1002 Router DC Power Supply

This section provides information about the DC power supplies on the rear of the Cisco ASR 1002 Router. The recommended branch circuit breaker for the Cisco ASR 1002 Router DC power supply is 30Amp. Use an AWG #10 maximum wire gauge on the 30Amp circuit. The maximum branch circuit for the DC power supply module must not exceed 30Amp.

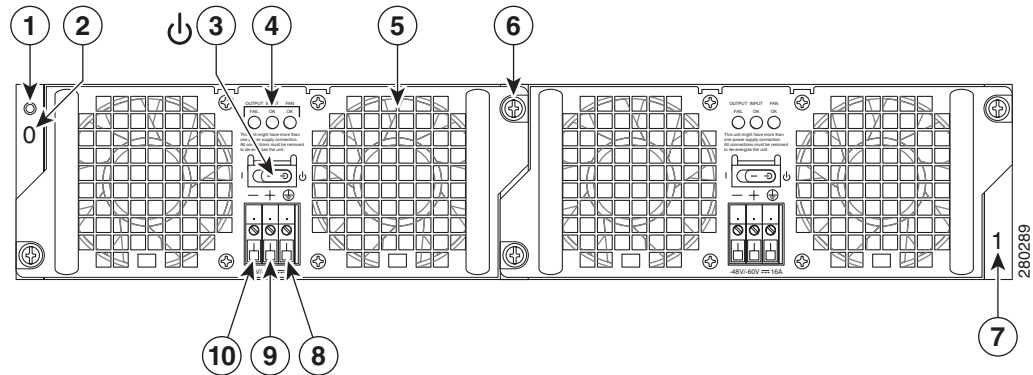
The Cisco ASR 1002 Router has two of the same type power supplies in power supply slot 0 and power supply slot 1. The power supply slot numbers are on the left side of the chassis and the power supplies are located on the floor of the chassis. The power supply switch is a Standby switch and is not considered a disconnect.

The DC input connector is a euro-style terminal block. The largest size gauge of wire that the front panel euro-terminal block can accept is AWG #10 wire. The terminal block is compliant to all safety agencies and electrical requirements of the power supply. Use the tie wraps to dress the input cable wires; there are two tie wrap tabs on the DC power supply.

The DC power supply unit is secured into the system chassis with two captive screws mounted on the faceplate.

Cisco ASR 1002 Router DC Power Supply LEDs and Connector

[Figure 2-17](#) shows the DC power supplies at the rear of the Cisco ASR 1002 Router. The Cisco ASR 1002 Router supports up to two power supplies. The power supply LEDs and connectors on the rear of the chassis are described in the [Table 2-20](#).

Figure 2-17 Cisco ASR 1002 Router DC Power Supply

1	Chassis ESD socket	6	DC power supply captive installation screw
2	DC power supply slot 0 label	7	DC power supply slot 1 label
3	DC power supply switch Standby/On (I) (standby symbol is a broken circle with a vertical line through the top of it)	8	Earth ground lead
4	DC power supply LEDs	9	Positive lead
5	Fan	10	Negative lead

Table 2-20 describes the LEDs on the Cisco ASR 1002 Router DC power supply.

Table 2-20 Cisco ASR 1002 Router DC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	A bi-color LED indicates presence of input voltage	Green	LED illuminates green to signal that the DC power supply input voltage is greater than -43.5VDC at turn-on and remains green down to -39VDC.
		Amber	The LED illuminates amber when the input voltage (falls below -39VDC) and indicates that there is still a voltage present (voltage on the terminal block). The LED remains amber and is active to around 20V +/-5V. The LED is not illuminated if the input is below -15V.
FAN OK	A bi-color LED indicates power supply fan status	Green	The LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	When the LED is off, it signals that the DC output voltage are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an Output Fail alarm. When you turn the power supply on, the red LED illuminates for two to three seconds to test LED operation before going off.

DC Power System Input for Cisco ASR 1002

The DC power supply operates within specification from –40.5VDC to –72VDC continuously once the power supply DC input turn on threshold of –43.5V has been reached. [Table 2-21](#) shows the common input ranges for *reference* only. The DC power input connector is a euro-style terminal block that accepts three wires, one positive, one negative, and one grounding wire.

Table 2-21 Cisco ASR 1002 Router DC Power System Input

Voltage Range (VDC)	Minimum	Nominal	Maximum
Domestic	–40.5	–48	–56
International	–55	–60	–72

DC Power System Output for Cisco ASR 1002

The DC power supply output tolerance is defined in [Table 2-22](#) under all combinations of DC input line variation. Total system power consumption should not exceed 470 watts or output rating of each power supply.



Note

Two power supplies are used for redundant operation. System total power consumption shall never exceed rating of one power supply to maintain redundancy.

Table 2-22 Cisco ASR 1002 Router DC Power System Output Voltage and Current

Output Voltage	+12 VDC	+3.3 V
Minimum	–11.80 VDC	–3.20 VDC
Nominal	–12.00 VDC	–3.30 VDC
Maximum	–12.20 VDC	–3.40 VDC
Output Current		
Minimum	–2.0 A	–0.10 A
Maximum	–39 A	–3.125 A



CHAPTER 3

Preparing Your Site for Installation

Before you install the Cisco ASR1000 Series Aggregation Services Routers, consider:

- The power and cabling requirements that must be in place at your installation site
- The equipment required to install the router
- The environmental conditions your installation site must meet to maintain normal operation

This chapter contains important safety information you should know before working with the Cisco ASR 1000 Series Aggregation Services Routers and guides you through the process of preparing your site for router installation.



Note

Do not unpack the system until you are ready to install it. Keep the chassis in the shipping container to prevent accidental damage until you determined an installation site. Use the appropriate unpacking documentation included with the system.

This chapter contains the following sections:

- [Safety Recommendations, page 3-2](#)
- [Safety Warnings, page 3-2](#)
- [Site Planning, page 3-7](#)
- [Preventing Electrostatic Discharge Damage, page 3-17](#)
- [Electrical Safety, page 3-18](#)
- [Receiving a Cisco ASR 1000 Series Router, page 3-19](#)
- [Chassis-Lifting Guidelines, page 3-20](#)
- [Tools and Equipment, page 3-21](#)
- [Checking the Shipping Container Contents, page 3-21](#)
- [Cisco ASR 1000 Series Router Installation Checklist, page 3-23](#)

Safety Recommendations

The following guidelines will help to ensure your own safety and protect your Cisco equipment. This list does not cover all potentially hazardous situations, so *be alert*.

- Cisco safety policy is that all of its routers must conform to the requirements of IEC 60950, with appropriate national deviations, as a minimum. In addition, Cisco routers must also meet the requirements of any other normative documents (for example, standards, technical specifications, laws or regulations).
- Review the safety warnings listed in the *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers* that accompanied your Cisco ASR 1000 Series Router, before installing, configuring, or maintaining the router.
- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always turn all power supplies off and unplug all power cables before opening the chassis.
- Always unplug the power cable before installing or removing a chassis.
- Keep the chassis area clear and dust free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.
- The Cisco ASR 1000 Series Routers operate safely when it is used in accordance with its marked electrical ratings and product usage instructions.

Safety Warnings



Read the installation instructions in this document before you connect the system to its power source. Failure to read and follow these guidelines could lead to an unsuccessful installation and possibly damage to the system and components.

You should observe the following safety guidelines when working with any equipment that connects to electrical power or telephone wiring. These guidelines help you avoid injuring yourself or damaging the devices.

Compliance Requirements

This section includes Safety Compliance and Network Equipment Building Systems (NEBS) standards. The Cisco ASR1000 Series routers are in compliance with national and international standards as described in [Table 1](#).

Table 1 *NEBS Compliance Requirements*

Safety Compliance and NEBS Requirements	
Specification	Description
Safety	 <p>Caution To comply with Class A emissions requirements, shielded-twisted pair T1/E1 cables must be used with the 8-port channelized T1/E1 SPA interface in any Cisco ASR1000 Series chassis.</p>
Telcordia NEBS GR-1089-Core Statement	 <p>Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, for Ethernet RJ-45 ports, use only shielded Ethernet cables that are grounded on both ends. In a NEBS installation, all Ethernet ports are limited to intrabuilding wiring.</p>
	GR-1089
	GR-63

Cautions and Regulatory Compliance Statements for NEBS

Table 2 lists cautions, regulatory compliance statements, and requirements for the Network Equipment-Building System (NEBS) certification from the Telcordia Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment (A Module of LSSGR, FR-64; TSGR, FR-440; and NEBSFR, FR-2063) Telcordia Technologies Generic Requirements, GR-1089-CORE, Issue 4, June 2006.

Table 2 *NEBS Compliance Statements*



Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface.	
 <p>Caution</p>	To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, for Ethernet RJ-45 ports, use only shielded Ethernet cables that are grounded on both ends. In a NEBS installation, all Ethernet ports are limited to intrabuilding wiring.
 <p>Caution</p>	The intrabuilding ports of the equipment or subassembly is only suitable for connection to intrabuilding or unexposed wiring or cabling. The intrabuilding ports of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use only as intrabuilding interfaces (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4), and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Table 2 NEBS Compliance Statements (continued)

Products that have an AC power connection are intended for deployments where an external surge protective device (SPD) is used at the AC power service equipment as defined by the National Electric Code (NEC).

This product is designed for a common bonding network (CBN) installation.

This product can be installed in a network telecommunication facility or location where the NEC applies.

An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or nonconductive coatings and establish a metal-to-metal contact. Any paint or other nonconductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

The grounding architecture of this product is DC-isolated (DC-I).

DC-powered products have a nominal operating DC voltage of 48 VDC. Minimal steady state DC operating voltage is 40 VDC. Reference American National Standards Institute (ANSI) T1.315, Table 1.

**Note**

The English warnings in this document are followed by a statement number. To see the translations of a warning into other languages, look up its statement number in the *Regulatory, Compliance, and Safety Information for the Cisco Aggregation Services Router 1000 Series* document.

Standard Warning Statements

This section describes the warning definition and then lists core safety warnings grouped by topic.

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Statement 1071

General Safety Warnings

**Warning**

Read the installation instructions before you connect the system to its power source. Statement 1004

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

**Warning**

No user-serviceable parts inside Do not open. Statement 1040

**Warning**

Installation of the equipment must comply with local and national electrical codes. Statement 1074

**Warning**

To comply with the Class A emissions requirements shielded twisted pair T1/E1 cables must be used for SPA-8-Port Channelized T1/E1 SPA (SPA-8XCHT1/E1) on the Cisco ASR1006, ASR1004, and ASR1002. EN55022/CISPR22 Statement

**Warning**

To comply with Class A emissions requirements- shielded management Ethernet, CON, and AUX cables on the Cisco ASR1002 must be used.

**Warning**

Power cable and AC adapter - When installing the product, please use the provided or designated connection cables/power cables/AC adaptors. Using any other cables or adapters could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of certified cables (that have the 'UL' shown on the code) for any other electrical devices than products designated by Cisco. The use of cables that are certified by Electrical Appliance and Material Safety Law (that have 'PSE' shown on the code) is not limited to Cisco-designated products. Statement 371

**Warning**

Only trained and qualified personnel should be allowed to install or replace this equipment Statement 1030

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies for the Cisco ASR 1004 Router, Cisco ASR 1006 Router, and Cisco ASR 1002 Router: 120 VAC, 20A U.S. maximum. DC power supplies for the Cisco ASR 1004 Router: 40A U.S. maximum. DC power supplies for the Cisco ASR 1006 Router: 50A U.S. maximum. DC power supplies for the ASR 1002 Router: 30A U.S. maximum. Statement 1005

**Warning**

This product requires short-circuit (overcurrent) protection to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

**Warning**

This unit may have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

**Warning**

The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019

**Warning**

Hazardous voltage or energy may be present on the DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1075

**Warning**

Use copper conductors only. Statement 1025

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034

**Warning**

Class 1 laser product. Statement 1008

**Warning**

Class 1 LED product. Statement 1027

**Warning**

Laser radiation is present when the system is open. Statement 1009

**Warning**

Do not stare into the laser beam. Statement 1010

**Warning**

Class I(CDRH) and Class 1M (IEC) laser products. Statement 1055

**Warning**

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Statement 1056

**Warning**

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015

**Warning**

Do not touch or bridge the metal contacts on the battery. Unintentional discharge of the batteries can cause serious burns. Statement 341

**Warning**

To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032

**Warning**

To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 40 degrees C. Statement 1047

**Warning**

This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 366

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Site Planning

This section contains site planning information, and will help you plan for the installation of the Cisco ASR 1000 Series routers. It contains the following sections:

- [General Precautions, page 3-7](#)
- [Site Selection Guidelines, page 3-8](#)
- [Floor Loading Considerations, page 3-10](#)
- [Site Power Guidelines, page 3-10](#)
- [Site Cabling Guidelines, page 3-12](#)
- [Rack-Mounting and Location Guidelines, page 3-14](#)
- [Site Planning Checklist, page 3-17](#)

General Precautions

Observe the following general precautions when using and working with your Cisco ASR1000 Series system.

- Keep your system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.

- Position system cables and power supply cables carefully. Route system cables and the power supply cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing else rests on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid system component damage.

Site Selection Guidelines

The Cisco ASR 1000 Series Routers require specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the router. The following sections provide specific information to help you plan for the proper operating environment.

The Cisco ASR1000 Series Routers are designed to meet the industry EMC, safety, and environmental standards described in the *Regulatory, Safety, and Compliance Information for Cisco ASR 1000 Series Aggregation Services Routers* document.

Site Environmental Requirements

Environmental monitoring in the Cisco ASR1000 Series router protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, make sure the site maintains the environmental characteristics as shown in [Table 3-3](#).

Table 3-3 Cisco ASR 1000 Series Router Environmental Tolerances

Environmental Characteristic	Minimum	Maximum
Steady State Operating	0 degree C	50 degree C (50 degrees C at 10,000 feet)
Storage	–20 degrees C	+70 degrees C
Humidity operating (noncondensing)	10%	90%
Humidity nonoperating (noncondensing)	5%	95%
Altitude operating: over allowable temperature range (0 to 50 degrees C)	–500 feet	10,000 feet
Altitude, nonoperating: over allowable temperature range	–1000 feet	50,000 feet
Thermal shock non-operating with change over time of 3 minute	–25 degrees C	+70 degrees C
Thermal Shock - Operating at 2.5 degree C per minute	0 degrees C	+50 degrees C

Physical Characteristics

Be familiar with the physical characteristics of the Cisco ASR 1000 Series Router to assist you in placing the system in the proper location.

Table 3-4 shows the weight and dimensions of the Cisco ASR 1000 Series Routers.

Table 3-4 Physical Characteristics of Cisco ASR 1000 Series Router

Characteristic	Cisco ASR 1006 Router	Cisco ASR 1004 Router	Cisco ASR 1002 Router
Height	10.47 in. (26.543 cm) - 6RU rack-mount per EIA RS-310 standard	6.95 in. (17.653 cm) - 4RU rack-mount per EIA RS-310 standard	3.47 in. (8.813 cm) - 2RU rack-mount per EIA RS-310
Width	17.25 in. (43.815 cm) - 19 inch rack-mount	17.25 (43.815 cm) - 19 inch rack-mount or optional 23 Telco rack mount	17.25 in. (43.815 cm) - 19-inch rack-mount or optional 23 Telco rack mount
Depth	22.50 in. (57.15 cm) (including card handles, cable-management brackets, power supply handles).	22.50 in.(57.15 cm) (including card handles, cable-management brackets, and power supply handles)	22.50 in. (57.15 cm) (including card handles, cable-management brackets, and power supply handles) for mounting in a 600mm-enclosed cabinet
Weight of fully configured chassis	75 lbs (34.019 kg)	50 lbs (22.679 kg)	40 lbs (18.143 kg)

The following list describes additional Cisco ASR 1000 Series chassis characteristics:

- Cisco ASR 1006 Router:
 - Chassis height meets EIA-310 rack spacing 6RU (10.47/266mm), universal rack mount
 - Chassis width meets EIA-310 19inch (17.25/438.15mm) wide with rack brackets
 - Cable-management brackets at each Cisco ASR 1000 Series SPA Interface (SIP) locations can hold 16 ports of STP/UTP RJ 45 cables
 - Cable-management brackets allow for 1.5 inch bend radii for cables
 - Adjustable rack mount brackets allow for a front to rear rail variance distance of 15.50/394mm to 19.00/482.6mm
- Cisco ASR 1004 Router:
 - Chassis height meets EIA-310 rack spacing 4RU (6.95 in/176.53mm), universal rack mount
 - Chassis width meets EIA-310 19inch (17.25/438.15mm) wide with rack brackets
 - Cable-management brackets at each Cisco ASR 1000 Series SPA Interface (SIP) locations can hold 16 ports of STP/UTP RJ 45 cables
 - Cable-management brackets allow for 1.5 inch bend radii for cables
 - Adjustable rack mount brackets allow for a front to rear rail variance distance of 15.50/394mm to 19.00/482.6mm
- Cisco ASR 1002 Router:
 - Chassis height meets EIA-310 rack spacing 2RU (3.47 in/ 88.138mm), universal rack mount
 - Chassis width meets EIA-310 19inch (17.25/438.15mm) wide with rack brackets
 - Cable-management brackets at the Cisco ASR 1002 Router location can hold 16 ports of STP/UTP RJ 45 cables

- Cable-management brackets allow for 1.5 inch bend radii for cables
- Adjustable rack mount brackets allow for a front to rear rail variance distance of 15.50/394mm to 19.00/482.6mm

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco 1000 Series Routers is capable of supporting the combined weight of the rack and all other installed equipment.

To assess the weight of the fully configured Cisco 1000 Series Router respectively, refer to [Table 3-4](#).

For additional information about floor loading requirements, consult the document *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection*.

Site Power Guidelines

The Cisco 1000 Series Router has specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site the Cisco ASR 1000 Series Router:

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- In systems configured with the redundant power option, connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.



Caution

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.



Note

The Cisco 1000 Series Router installation must comply with all applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with an AWG #6 gauge wire, copper ground conductor at a minimum.

Electrical Circuit Requirements

Each Cisco 1000 Series Router requires a dedicated electrical circuit. If you equip it with dual power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco ASR 1000 Series Routers can be powered by a DC or AC source. Ensure that the equipment grounding is present and observe power strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80% of the rating.

Table 3-5 contains specifications for DC powered systems for all Cisco ASR 1000 Series Routers.

Table 3-5 Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps		AWG # Wire	
		Minimum	Maximum	Minimum	Maximum
Cisco ASR 1006	40	Always 50		Always AWG #6 wire	
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20Amp circuit breaker and an AWG #10 gauge wire for a 30Amp circuit breaker.



Note

All Cisco ASR 1000 Series Router AC power supplies require a 20 AMP circuit breaker.

The AC and DC power supplies for the Cisco ASR 1000 Series Routers support different types of power supply switches. Table 3-6 defines which power supplies the Cisco ASR 1000 Series routers support (a Standby or an On/Off switch).

Table 3-6 Cisco ASR 1000 Series Routers AC and DC Power Supply Switches

Switch Type Supported	Symbol	Cisco ASR 1000 Series Router Power Supply
On/Off circuit	I/O	ASR 1006 DC ASR 1004 DC ASR 1002 AC
Standby Switch	A broken circle with a vertical line through the top of it	ASR 1006 AC ASR 1004 AC ASR 1002 DC

Table 3-7 lists AC and DC power supply system rating requirements for all Cisco ASR 1000 Series Routers.

Table 3-7 AC and DC Power Supply System Rating Specifications for the Cisco ASR 1000 Series Routers

Description	Specification
Power supply declared ratings	AC = 100-240 VAC DC = -48/ -60 VDC
Line frequency rating	50/60 Hz

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco 1000 Series Router, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, EMI, and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSUs), or data service units (DSUs).



Note

The E1 interface on the Cisco 8-Port Channelized T1/E1 SPA interface uses RJ-48c receptacles for E1 (120-Ohm) cables with RJ-45 connectors. You can use all ports simultaneously. Each E1 connection supports interfaces that meet the G.703 standards. The RJ-45 connection does not require an external transceiver. The E1 ports are E1 interfaces that use 120-ohm shielded twisted-pair (STP) cables.



Warning

Shielded T1/E1 cables must be used to comply with FCC/EN55022/CISPR22 Class A emissions requirements on the 8-port channelized T1/E1 SPA interface.

Before you install the Cisco 1000 Series Router, have all additional external equipment and cables on hand. For ordering information, contact a customer service representative.

The extent of your network and the distances between network interface connections depend in part on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections *prior to* installing the Cisco 1000 Series Router.

If wires exceed recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

Asynchronous Terminal Connections

The route processor provides a console port to connect a terminal or computer for local console access. The RP1 also provides an auxiliary port to connect to a modem for remote dial-in console access.

Both ports have RJ-45 connectors, support RS-232 asynchronous data, and have distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they can cause data errors or damage to the equipment.

The following sections describe sources of interference and how to minimize its effects on the Cisco 1000 Series Router system.

Electromagnetic Interference

All equipment powered by AC current can propagate electrical energy that can cause electromagnetic interference (EMI) and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the Cisco 1000 Series Router and even create an electrical hazard by causing power surges through power lines into installed equipment. These problems are rare, but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment, which could consume substantial time and money. However, you should ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

[Table 3-8](#) lists electrode magnetic compliance standards for the Cisco ASR 1000 Series Aggregation Services Routers.

Table 3-8 EMC Standards

EMC Standards	FCC 47 CFR Part 15 Class A
	VCCI Class A
	AS/NSZ Class A
	ICES-003 Class A
	EN55022/CISPR 22 Information Technology Equipment (Emissions)
	EN55024/CISPR 24 Information Technology Equipment (Immunity)
	EN300 386 Telecommunications Network Equipment (EMC)
	EN50082-1/EN61000-6-1 Generic Immunity Standard
CE marking	UL60950-1
	CSA C22.2 No. 60950-1-03
	EN 60950-1

Table 3-8 EMC Standards

IEC 60950-1
AS/NZS 60950.1

Radio Frequency Interference

When electromagnetic fields act over a long distance, radio frequency interference (RFI) can be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal.

Lightning and AC Power Fault Interference

If signal wires exceed recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco 1000 Series Router.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI/EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco 1000 Series Router operating environment.

Rack-Mounting and Location Guidelines

The Cisco 1000 Series Router is designed for standalone, two-post 19 inch rack-mount, four-post 19 inch rack-mount and closed cabinet systems with front and rear doors. You can mount the Cisco 1000 Series Router on an equipment shelf or tabletop.

The sections that follow describe criteria for selecting a rack to mount the Cisco 1000 Series Router, guidelines for placing the rack for reliable operation, and safety precautions to take to prevent bodily injury when mounting a Cisco ASR1000 Series system in a rack.

Precautions for Rack-Mounting

The following rack-mount guidelines are provided to ensure your safety:

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to components in the rack.
- Do not step or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco 1000 Series Router in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, then install the stabilizers before mounting or servicing the unit in the rack.

Rack Selection Guidelines

The Cisco 1000 Series Router can be mounted in most two-post or four-post, 19-inch equipment racks that comply with the Electronics Industries Association (EIA) standard for equipment racks (EIA-310-D 19-inch). The rack must have at least two posts with mounting flanges to mount the chassis.

**Caution**

When mounting a chassis in any type of rack equipment, make certain the inlet air to the chassis does not exceed 55C.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inches \pm 0.06 inch (46.50 cm \pm 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-inch equipment racks.

We recommend that you mount the Cisco 1000 Series Router in an equipment rack which includes the necessary rack-mounting hardware which is suitable for most 19-inch equipment racks.

Consider installing the Cisco 1000 Series Router in a rack with the following features:

- NEBS compliant, 19-inch (48.3 cm) wide rack.
- EIA or ETSI hole patterns in the mounting rails. Required mounting hardware is shipped with the Cisco 1000 Series Router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

**Note**

The Cisco 1000 Series Router should *not* be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—even with the front and back doors removed—could disrupt the air flow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, make certain that there are air vents on all sides of the rack and there is proper ventilation.

Equipment Rack Guidelines

The placement of the rack can affect personnel safety, system maintenance, and the system ability to operate within the environmental characteristics described in [Table 3-3 on page 3-8](#). Choose a proper location for the Cisco 1000 Series Router by following the guidelines below.

Locating for Safety

If the Cisco 1000 Series Router is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack center of gravity is as low as possible.

For additional information about the proper placement of electronic equipment, consult the document *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection*.

Locating for Easy Maintenance

Keep at least 3 feet of clear space in front and behind the rack. This space ensures that you can remove the Cisco 1000 Series Router components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco 1000 Series Router in a congested rack and consider how the routing of cables from other pieces of equipment in the same rack could affect access to the routers cards.

The front and top of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 inches (7.6 cm)
- In the front of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

To avoid problems during installation and ongoing operation, follow these general precautions when you plan the equipment locations and connections:

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings for high temperature and creates reports on any occurrences. If warning messages are displayed, take immediate action to identify the cause and correct the problem.
- Keep the Cisco 1000 Series Router off of the floor and out of areas that collect dust.
- Follow ESD prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for Proper Airflow

Ensure the location of the Cisco 1000 Series Router has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system.

Avoid locating the Cisco 1000 Series Router in a location in which the chassis air intake vents could draw in the exhaust air from adjacent equipment. Consider how the air flows through the Cisco 1000 Series Router. The Cisco 1000 Series Router airflow direction is front to back with ambient air drawn in from the venting located on the chassis front sides.

Site Planning Checklist

Table 3-9 is provided to help you perform and account for all the site planning tasks presented in this appendix.

Table 3-9 Site Planning Checklist

	Site Planning Requirements
	The site meets the environmental requirements.
	The site air conditioning system can compensate for the heat dissipation of the Cisco ASR 1000 Series.
	The floor space that the Cisco ASR 1000 Series Routers occupy can support the weight of the system).
	Electrical service to the site complies with the requirements.
	The electrical circuit servicing the Cisco ASR 1000 Series complies with the requirements).
	Consideration has been given to the console port wiring, and limitations of the cabling involved, according to TIA/EIA-232F.
	The Cisco 1000 Series Router Ethernet cabling distances are within limitations.
	The equipment rack in which you plan to install the Cisco ASR 1000 Series chassis complies with requirements.
	Careful consideration has be given to safety, ease of maintenance, and proper airflow in selecting the location of the rack.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, occurs when electronic cards or components are improperly handled and can result in complete or intermittent failures. The performance routing engine (PRE), and all line cards consist of a printed circuit card that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the cards from ESD, use an antistatic strap each time you handle the modules. Handle the carriers by the edges only; never touch the cards or connector pins.



Caution

Always tighten the captive installation screws on all system components when you are installing them. These screws prevent accidental removal of the module, provide proper grounding for the system, and help to ensure that the bus connectors are properly seated in the backplane.

Static electricity can harm delicate components inside your system. To prevent static damage, discharge static electricity from your body before you touch any of your system components, such as an microprocessor. As you continue to work on your system, periodically touch an unpainted metal surface on the computer chassis.

Following are guidelines for preventing ESD damage:

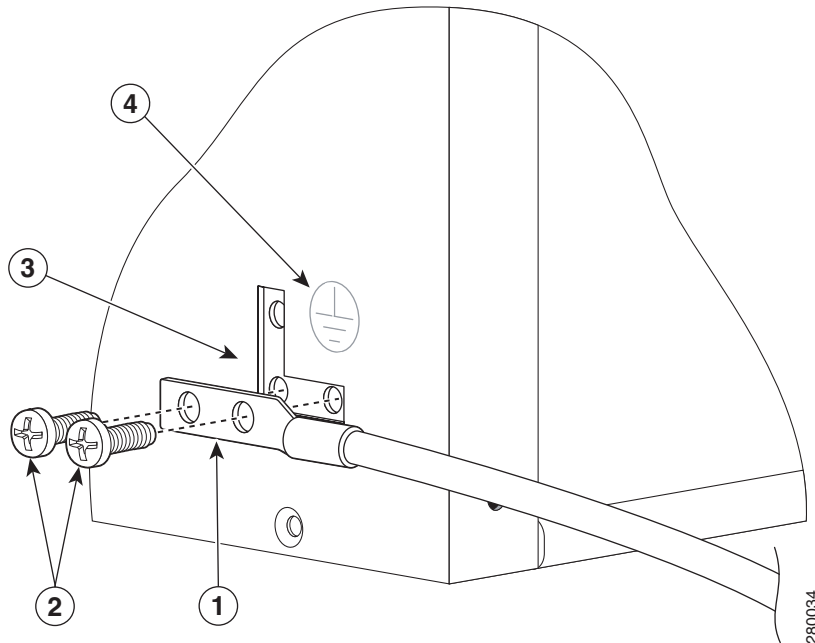
- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Before removing a card from the chassis, connect the equipment end of the strap to the ESD plug at the bottom of the chassis below the power entry modules (Figure 3-1).

- Handle line cards by the faceplates and carrier edges only; avoid touching the card components or any connector pins.
- When removing a card, place the removed module component-side-up on an antistatic surface or in a static-shielding bag. If the module will be returned to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the modules and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

**Caution**

For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 ohms.

Figure 3-1 ESD Chassis Grounding Stud



1	Chassis earth ground studs and lead wire	3	Earth ground connector on the chassis
2	Grounding screws	4	Earth ground symbol

Electrical Safety

All system components are hot-swappable. They are designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

Follow these basic guidelines when you are working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.

- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source but is still connected to telephone wiring or other network cabling.

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

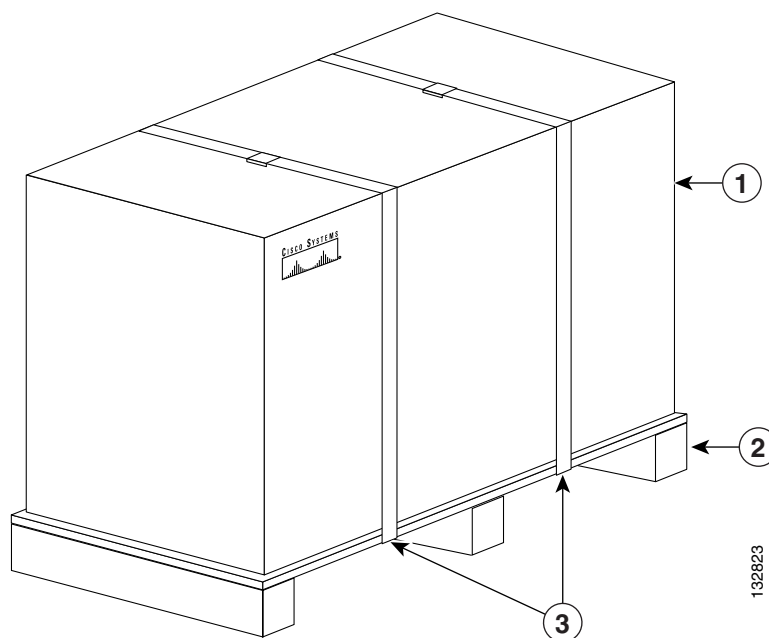
**Warning**

Do not work on the system or connect or disconnect cables during periods of lightning activity.

Statement 1001

Receiving a Cisco ASR 1000 Series Router

Each Cisco ASR1000 Series chassis is shipped in a container that is strapped to a pallet as illustrated in [Figure 3-2](#).

Figure 3-2 Cisco ASR 1000 Series Router Packaged for Shipping

1	Outside carton	3	Packing straps
2	Pallet		

**Note**

We recommend that you have at least two people available to help with the installation and ensure safe lifting.

Chassis-Lifting Guidelines

The fully configured system weighs approximately 75 pounds. The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so you can avoid having to move the chassis later to accommodate power sources and network connections.

Two or more people are required to lift the chassis. Each time you lift the chassis or any heavy object, follow these guidelines:

- Never attempt to lift the chassis by yourself. Because of the size and weight of the chassis, use at least two people to safely lift and move it without causing injury or damaging the equipment.
- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.

-
- Step 1** Each person should stand on either side of the chassis and place one hand under the air intake at the bottom front of the chassis.
- Step 2** With the other hand, grasp the top rear of the chassis under the air exhaust and carefully lift the chassis.
-

Tools and Equipment

The tools and equipment listed below are recommended as the minimum necessary to install the Cisco ASR 1000 Series Router. You may need additional tools and equipment to install associated equipment and cables. You may also require test equipment to check electronic and optical signal levels, power levels, and communications links.

- Phillips hand screwdriver
- A 3.5mm flat-blade screwdriver
- Tape measure (optional)
- Level (optional)
- Power drill

Unpacking and Verifying Shipping Contents

When you receive your chassis, perform the following steps and use the shipping contents checklist from the next section:

-
- Step 1** Inspect the box for any shipping damage. (if there is damage contact your service representative).
- Step 2** Unpack the Cisco ASR 1000 Series Router.
- Step 3** Perform a visual inspection of the chassis.
- Step 4** After you have unpacked the system verify that you have received all of the required components. Using the packing list as a guide, take the following steps to check the contents of the Cisco ASR 1000 Series Router shipping container:
- Step 5** Check the contents of the boxes containing accessory items. Verify that you have received all equipment listed in your order.
- Step 6** Check that all Cisco ASR 1000 Series RP1s, Cisco ASR1000-ESP10s, Cisco ASR1000-ESP5, Cisco ASR 1000 Series SPA Interface (SIP), and power supplies you ordered are installed in the chassis. Ensure that the configuration matches the packing list.
-

Checking the Shipping Container Contents

Use the components list to check the contents of the Cisco ASR 1000 Series Router shipping container. Do not discard the shipping container. You need the container if you move or ship the Cisco ASR 1000 Series Router in the future.

Table 3-10 Cisco ASR 1000 Series Router Shipping Container Contents List

Component	Description	Received
Chassis	Cisco ASR 1000 Series Router configured with dual AC or dual DC power supplies and a shared port adapter blank panel if a shared port adapter has not been ordered.	
Accessories Kit	Front and rear chassis rack-mount brackets that you will attach to the chassis with the respective screws	
	Three sets of screws, one set for: <ul style="list-style-type: none"> • Front rack-mount brackets (use the black screws) • Rear rack-mount brackets (use the package with the 5 screws) • Cable-management brackets (use the 4 screw package) 	
	Two cable-management brackets with 'U' feature design devices attached; a different size for each chassis.	
ESD, Wrist Strap (disposable)	1 disposable wrist strap	
Documentation	Regulatory Compliance and Safety Information for Cisco Aggregation Services 1000 Series Chassis document	
Optional Equipment	Power cord if an AC power supply was shipped. There are none for the DC power supply units.	

**Note**

Most Cisco documentation is online or on the Cisco Documentation DVD. Documentation that ships with your Cisco ASR1000 Series router includes the *Regulatory Compliance and Safety Information for the Cisco Aggregation Services Router 1000 Series* document, and the *Cisco Aggregation Services Router 1000 Series Documentation Roadmap* that contains documentation titles and the URLs to them online. See also the [“Related Documentation”](#) section on page xviii.

Cisco ASR 1000 Series Router Installation Checklist

To assist you with your installation and to provide a historical record of what was done by whom, photocopy the Cisco ASR 1000 Series Router Installation Checklist. Use this to indicate when each procedure or verification is completed. When the checklist is completed, place it in your site log along with the other records for your new router.

Table 3-11 *Cisco ASR 1000 Series Router Installation Checklist*

Task	Verified By	Date
Date chassis received		
Chassis and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation Checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, available		
Required tools available		
Network connection equipment available		
Cable-management bracket installed (optional but recommended)		
AC power cable(s) connected to AC source(s) and router		
DC power cable(s) connected to DC source(s) and router		
Network interface cables and devices connected		
System power turned on		
System boot complete (STATUS LED is on)		
Shared port adapters are operational		
Correct hardware configuration displayed after system banner appears		



CHAPTER 4

Cisco ASR 1006 Router Overview and Installation

This chapter describes the Cisco ASR 1006 Router and provides the procedures for installing the Cisco ASR 1006 Router on an equipment shelf or tabletop or in equipment racks. It also describes how to connect interface and power cables.

This chapter contains the following sections:

- [Cisco ASR 1006 Router Description, page 4-1](#)
- [General Rack Installation Guidelines, page 4-4](#)
- [Guidelines for an Equipment Shelf or Tabletop Installation, page 4-5](#)
- [Equipment Shelf or Tabletop Installation, page 4-6](#)
- [Rack-Mounting a Cisco ASR 1006 Router, page 4-8](#)
- [Attaching the Cable-Management Bracket, page 4-16](#)
- [Attaching a Chassis Ground Connection, page 4-17](#)
- [Connecting Power to Cisco ASR 1006 Router, page 4-21](#)
- [Connecting a Terminal to the Cisco ASR 1000 Series RP1 Console Port, page 4-27](#)
- [Connecting System Cables, page 4-29](#)

Cisco ASR 1006 Router Description

The Cisco ASR 1006 Router supports full-width card modules. It is designed with a single midplane with connectors on one interface midplane. The Cisco ASR 1006 Router supports:

- Three Cisco ASR 1000 Series SPA Interface Processor (SIP)
- Twelve SPA slots
- Two Cisco ASR 1000 Series Embedded Services Processor (Cisco ASR1000-ESP10 or Cisco ASR1000-ESP20)
- Two Cisco ASR 1000 Series Route Processor 1 (RP1)
- Dual (redundant) AC and DC power supplies

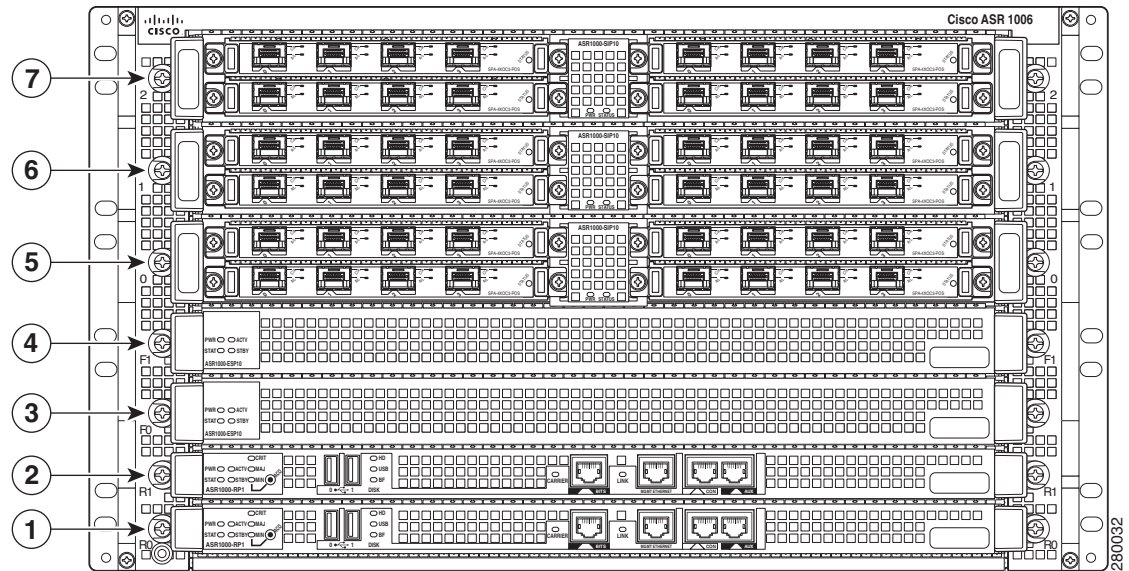
This section contains the following topics:

- [Front View, page 4-2](#)
- [Rear View, page 4-2](#)

Front View

Figure 4-1 shows the Cisco ASR 1006 Router with modules and filler plates installed.

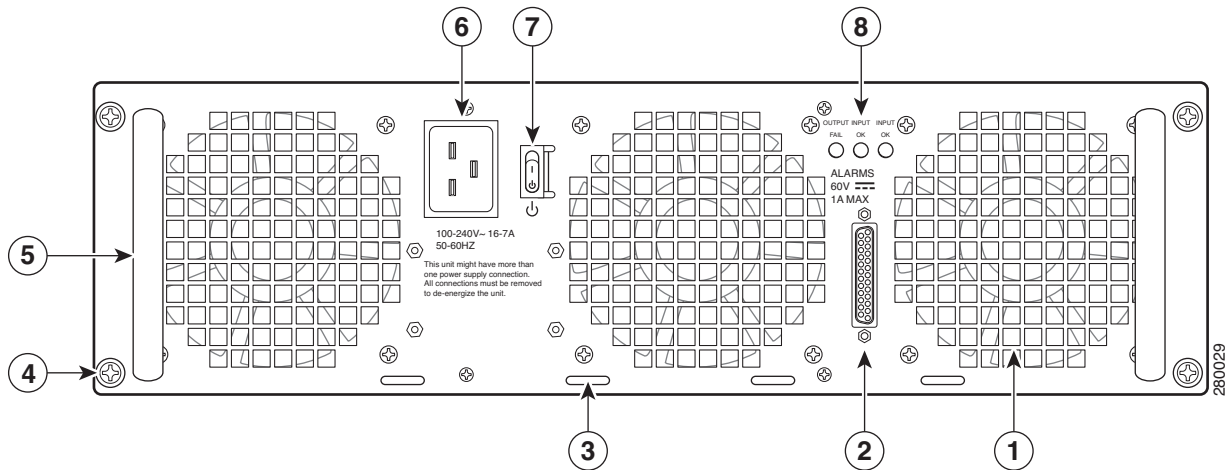
Figure 4-1 Cisco ASR 1006 Router –Front View



1	Slot RP0 with ASR 1000 Series RP1	5	ASR 1000 Series SIP slot 0
2	Slot RP1 with ASR 1000 Series RP1	6	ASR 1000 Series SIP slot 1
3	Slot FP0 with ASR 1000 Series ESP	7	ASR 1000 Series SIP slot 2
4	Slot FP1 with ASR 1000 Series ESP		

Rear View

Figure 4-2 shows the rear of the Cisco ASR 1006 Router with an AC power supplies installed.

Figure 4-2 Cisco ASR 1006 Router Rear View With AC Power Supply

1	AC power supply fan	5	AC power supply handle
2	AC power supply DB-25 alarm connector—A female DB-25 D-sub connector which enables you to attach an external alarm monitoring facility to the router, thus supporting a telco-style of handling alarm conditions in the router.	6	AC power inlet
3	Cable tie wrap tabs	7	AC power supply Standby switch (standby symbol is a broken circle with a vertical line through the top of it). A Standby switch is not considered a disconnect.
4	AC power supply captive screws	8	AC power supply LEDs

Internal fans draw cooling air into the chassis and across internal components to maintain an acceptable operating temperature. (See [Figure 4-2](#).) The fans are located at the rear of the chassis. A two-hole grounding lug is located on the side of the chassis. Two power supplies, either two AC power supplies or two DC power supplies, are accessed from the rear of the router.

**Note**

You have already unpacked your chassis and read all the site requirements for your new equipment. Proceed with the installation.

**Note**

Do not combine AC and DC power supplies in the same chassis.

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.
Statement 1071

**Warning**

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco ASR 1000 Series Aggregation Services Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

**Note**

You have already unpacked your chassis and read all the site requirements for your new equipment. Proceed with the installation.

Installation Methods

Although rack-mounting is the preferred method of installation for the Cisco ASR 1006 Router, you can mount the chassis:

- On an equipment shelf or tabletop
- In a 19-inch wide (standard), 4-post equipment rack or two-post, using the rack-mount brackets in the accessory kit

**Note**

The Cisco ASR 1006 Router usually ships fully loaded. However, you can remove components from the chassis to make the chassis lighter for your rack installation.

General Rack Installation Guidelines

When planning your rack installation, consider the following guidelines:

- The Cisco ASR 1006 Router requires a minimum of 7 rack units (22.3 inches or 56.6 cm) of vertical rack space. Measure the proposed rack location before mounting the chassis in the rack.
- Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rack-mount installation, remove the power strip before installing the chassis, and then replace it after the chassis is installed.
- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or moving cards, connecting cables, or replacing or upgrading components). Otherwise, allow 19 inches (48.3 cm) of clearance to remove field-replaceable units.
- Maintain a minimum clearance of 3 inches (7.62 cm) on the front, top, and sides of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the chassis in an overly congested rack or directly next to another equipment rack; otherwise, the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.

**Caution**

To prevent chassis overheating, never install a Cisco ASR 1006 Router in an enclosed room that is not properly ventilated or air conditioned.

- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity to prevent the rack from falling over.

- Install and use the cable-management brackets included with the Cisco ASR 1006 Router to keep cables organized and out of the way of the cards and processors. Ensure that cables from other equipment already installed in the rack do not impair access to the cards or require you to disconnect cables unnecessarily to perform equipment maintenance or upgrades.
- Install rack stabilizers (if available) before you mount the chassis.
- Provide an adequate chassis ground (earth) connection for your router chassis.

In addition to the preceding guidelines, review the precautions for avoiding excessive temperature conditions in the [“Electrical Safety” section on page 3-18](#).

[Table 4-1](#) provides the Cisco ASR 1006 Router dimensions and weight information.

Table 4-1 Cisco ASR 1006 Router Dimensions and Weight

Cisco ASR 1006	Dimensions
Depth	22.50 in. (57.15 cm) (including card handles, cable-management brackets, power supply handles).
Height	10.45 in. (26.543 cm) - 6RU rack-mount per EIA RS-310 standard
Width	17.25 in. (43.815 cm) - 19 inch rack-mount
Weight	75 lb (34.019 kg) - fully configured

Guidelines for an Equipment Shelf or Tabletop Installation

The chassis should already be in the area where you will install it. If you have not determined where to install your chassis, see [Cisco ASR 1000 Series Routers Components, page 2-1](#) for information about site considerations.

If you are not rack-mounting your Cisco ASR1000 series chassis, place it on a sturdy equipment shelf or tabletop.

When installing the Cisco ASR 1006 Router on an equipment shelf or tabletop, ensure that the surface is clean and that you have considered the following:

- The Cisco ASR 1006 Router requires at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents (the front and top/rear sides of the chassis).
- The Cisco ASR 1006 Router should be installed off the floor. Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.
- There must be approximately 19 inches (48.3 cm) of clearance at the front and rear of the chassis to install and replace FRUs, or to access network cables and equipment.
- The Cisco ASR 1006 Router needs adequate ventilation. Do not install it in an enclosed cabinet where ventilation is inadequate.
- Have the cable-management bracket available if you plan to install it on the front of the chassis.
- An adequate chassis ground (earth) connection exists for your router chassis (see the [“Attaching a Chassis Ground Connection” section on page 4-17](#)).
- Always follow proper lifting practices as outlined in the [“Chassis-Lifting Guidelines” section on page 3-20](#), when handling the chassis.

Equipment Shelf or Tabletop Installation

To mount your Cisco ASR 1006 Router on an equipment shelf or tabletop, follow these steps.

Step 1 Remove any debris and dust from the tabletop or platform, as well as the surrounding area.

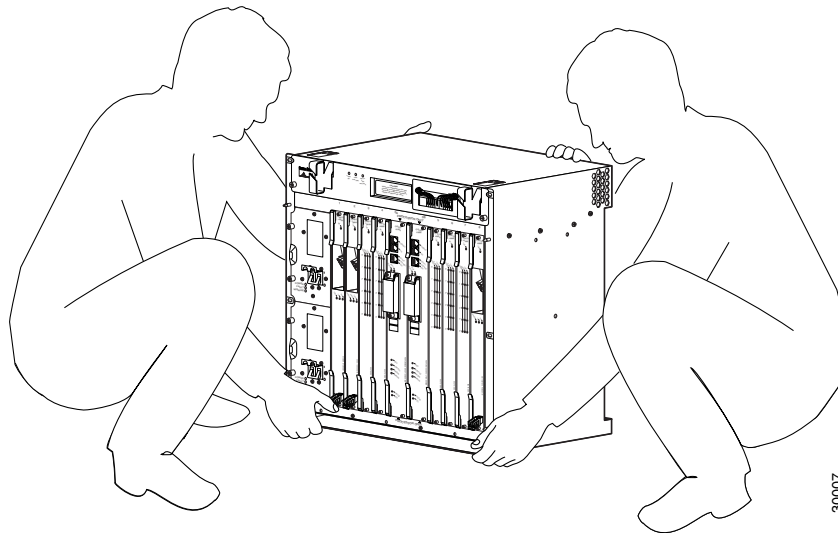
Step 2 Lift the chassis into position on the equipment shelf or tabletop.



Warning

At least two people are required to lift the chassis onto a tabletop or platform. To prevent injury, keep your back straight and lift with your legs, not your back. Statement 164

Figure 4-3 *Lifting the Chassis*



Note

The chassis in [Figure 4-3](#) does not represent the Cisco ASR 1000 Series Router. This is only an example of how to lift a Cisco chassis.

Step 1 Attach the front rack-mount brackets. Locate the threaded holes in the front sides of the chassis (first holes beyond the vent holes) and use the package of black screws that shipped with the chassis.

Step 2 Align the front rack-mount bracket to one side of the chassis.

Step 3 Insert and tighten the screws on one side.

Step 4 Repeat Step 2 through Step 3 on the other side of the chassis. Use at least 4 screws to secure the rack-mount brackets to the chassis.



Note

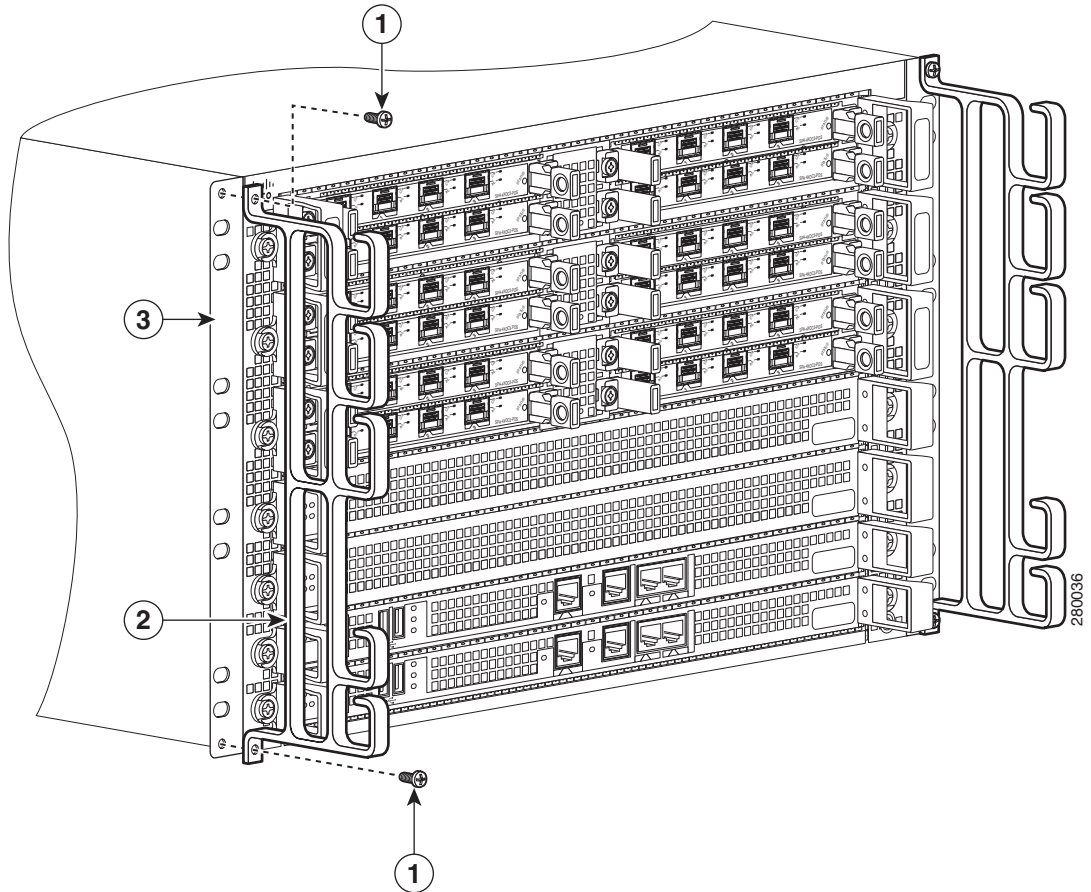
The cable-management brackets are installed on the chassis after you install the chassis rack-mount brackets.

- Step 5** Obtain the two cable-management brackets and screws shipped with your chassis. [Figure 4-4](#) shows attached cable-management brackets on the front of the Cisco ASR 1006 Router. when the chassis is placed on a table top or equipment shelf.



Note Make certain that the cable-management ‘U’ feature device has the open end pointing upwards when you attach it to the chassis

Figure 4-4 Attaching the Cable-Management Brackets to the Cisco ASR 1006 Router



1	Cable-management screws	3	Chassis front rack-mount bracket
2	Cable-management bracket		

- Step 6** Screw the cable-management bracket to each side of the rack-mount brackets already attached to the chassis. Use two screws for each cable-management bracket. Use the package of four screws.
- Step 7** Check that all screws are securely tightened.
- Step 8** Go to the [“Attaching a Chassis Ground Connection”](#) section on [page 4-17](#) to continue the installation.

Rack-Mounting a Cisco ASR 1006 Router

The Cisco ASR 1006 Router can be installed with both front or rear rack-mount brackets. The chassis rack-mounting flanges are secured directly to the chassis before you lift it into the rack. For installing Cisco ASR 1006 Router rack-mount brackets, go to:

- “Chassis Front Rack-Mount Brackets” section on page 4-9
- “Chassis Rear Rack-Mount Brackets” section on page 4-10

Verifying Rack Dimensions

Before you install the chassis, measure the space between the vertical mounting flanges (rails) on your equipment rack to verify that the rack conforms to the measurements shown in [Figure 4-5](#).

Step 1 Mark and measure the distance between two holes on the left and right mounting rails.

The distance should measure 18.31 inches \pm 0.06 inches (46.5 cm \pm 0.15 cm).

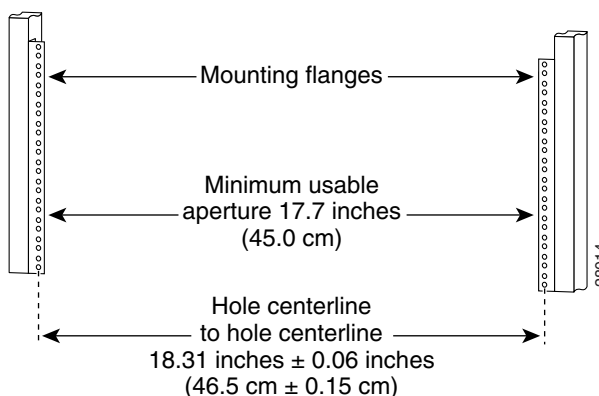


Note Measure for pairs of holes near the bottom, middle and top of the equipment rack to ensure that the rack posts are parallel.

Step 2 Measure the space between the inner edges of the left front and right front mounting flanges on the equipment rack.

The space must be at least 17.7 inches (45 cm) to accommodate the chassis which is 17.25 inches (43.8 cm) wide and fits between the mounting posts on the rack.

Figure 4-5 Verifying Equipment Rack Dimensions



Attaching the Chassis Rack-Mount Brackets

This section explains how to attach the front and rear rack-mount brackets to the chassis. Before installing the chassis in the rack, you must install the rack-mount brackets on each side of the chassis.

The parts and tools required for installing the rack-mount brackets and cable-management brackets are listed in the “Tools and Equipment” section on page 3-21.



Note

The cable-management brackets are installed on the chassis after you install the chassis rack-mount brackets and mount the chassis in the rack.

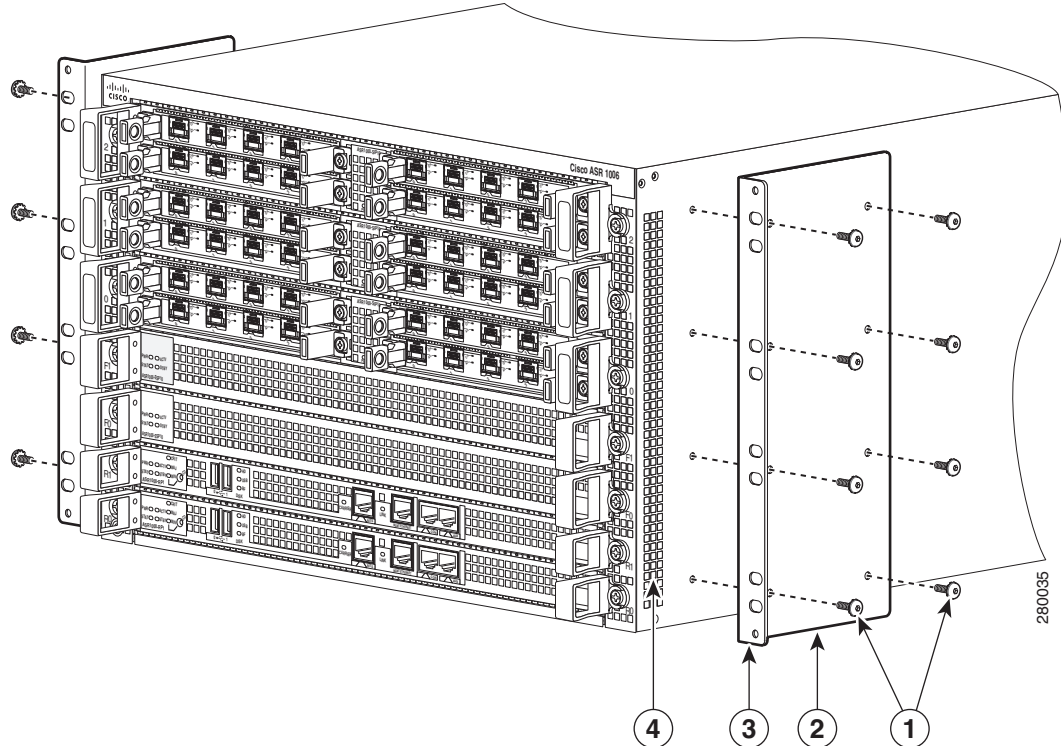
Chassis Front Rack-Mount Brackets

Determine where in the rack you want the chassis to be mounted. If you are mounting more than one chassis in the rack, then start from the bottom up or the center of the rack. Figure 4-6 shows the brackets attached to the chassis. Depending on the bracket holes you use, the chassis may protrude in the rack.

To install the front rack-mount brackets on a Cisco ASR 1006 Router, complete the following steps:

- Step 1** Locate the threaded holes on the side of the chassis. Make certain that you hold the front rack-mount bracket with the ear and holes facing outward and towards the front of the chassis (see Figure 4-6).

Figure 4-6 Attaching the Front Rack-Mount Brackets to the Cisco ASR 1006 Router



1	Front rack-mount bracket screws	3	Front rack-mount bracket ear and holes
2	Front rack-mount bracket	4	Chassis side vent location

- Step 2** Position the front rack-mount bracket top hole with the chassis first top hole behind the side vent holes (see [Figure 4-6](#)).
 - Step 3** Insert and tighten the black screws on one side.
 - Step 4** Repeat Step 1 through Step 3 on the other side of the chassis. Use black screws to secure the rack-mount brackets to the chassis.
 - Step 5** Install the chassis in the rack. To install the Cisco ASR 1006 Router in a rack, go to [Installing the Cisco ASR 1006 Router in a Rack, page 4-12](#).
-

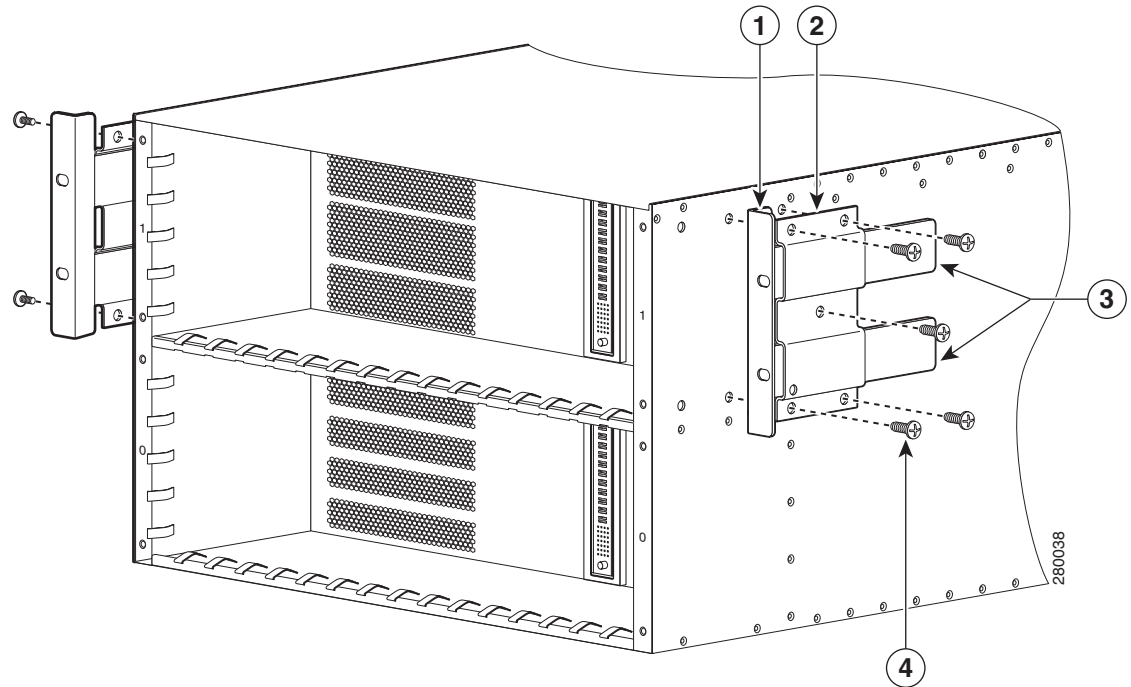
This completes the steps for attaching the front rack-mount brackets to the Cisco ASR 1006 Router.

Chassis Rear Rack-Mount Brackets

If you are rack mounting the chassis using the rear rack-mount brackets, then this type of installation provides for the chassis being recessed in the rack.

To install the front rack-mount brackets on a Cisco ASR 1006 Router, complete the following steps:

-
- Step 1** Locate the threaded holes on the rear side of the chassis. Make certain that you hold the rear rack-mount bracket with the ear and holes facing outward and towards the rear of the chassis (see [Figure 4-7](#)). [Figure 4-7](#) shows where to attach the rear rack-mount brackets to the Cisco ASR 1006 Router.

Figure 4-7 Attaching the Rear Rack-Mount Brackets to the Cisco ASR 1006 Router

1	Rear rack-mount bracket ear and holes	3	Rear rack-mount bracket components that slide into rear bracket attached to the chassis
2	Rear rack-mount bracket	4	Rear rack-mount bracket screws

- Step 2** Position the rear rack-mount bracket top hole with the chassis second top hole from the back (See [Figure 4-7](#)).
- Step 3** Insert and tighten the screws on one side.
- Step 4** After the bracket is secured to the side of the chassis, slide the two remaining components into the side rack-mount bracket.
- Step 5** Repeat Step 1 through Step 3 on the other side of the chassis. Use all the screws to secure the rear rack-mount brackets to the chassis.

This completes the steps for attaching the rear rack-mount brackets to the Cisco ASR 1006 Router.

**Caution**

Before you mount the ASR 1006 Router in a rack, make certain you read which rack-mount bracket ear holes to use when positioning the chassis in the rack. As a result of using the designated ear holes on the rack-mount bracket, the cable-management bracket installation will be made easier. For cable-management installation instructions, go to [Attaching the Cable-Management Bracket, page 4-16](#).

Installing the Cisco ASR 1006 Router in a Rack

After installing the rack-mount brackets on the chassis, you mount the chassis by securing the rack-mount brackets to two posts or mounting strips in the rack using the screws provided. Because the rack-mount brackets support the weight of the entire chassis, be sure to use all screws to fasten the two rack-mount brackets to the rack posts.

**Warning**

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

To install the chassis in the rack, complete the following steps:

- Step 1** On the chassis, ensure that all screw fasteners on the installed components are securely tightened.
- Step 2** Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized. See the next sections on the types of racks you can use to install the chassis.
- Step 3** (Optional) Install a shelf in the rack to support the Cisco ASR 1006 Router. If you use a shelf, this will help support the chassis while you secure it to the rack.
- Step 4** With two people, lift the chassis into position between the rack posts.
- Step 5** Align the mounting bracket holes with the rack post holes and attach the chassis to the rack.



Note If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis.

- Step 6** Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.
- Step 7** Hold the chassis in position against the mounting rails and follow these steps:
 - a.** Insert the bottom screw into the third hole up from the bottom of the rack mount ear and use a hand-held screwdriver to tighten the screw to the rack rail.

**Tip**

In the next step, insert the top screw diagonally from the bottom screw that you just attached. This helps with keeping the chassis in place.

- b.** Insert the top screw into the third hole down from the top of the rack mount ear and tighten the screw to the rack rail.
- c.** Insert a screw in the middle of the rack-mount bracket on both sides of the chassis.
- d.** Repeat these steps for the other side of the chassis.

**Note**

As a result of using the specified rack-mount bracket ear holes, the cable-management bracket can be easily attached to the rack-mount bracket when the chassis is in the rack.

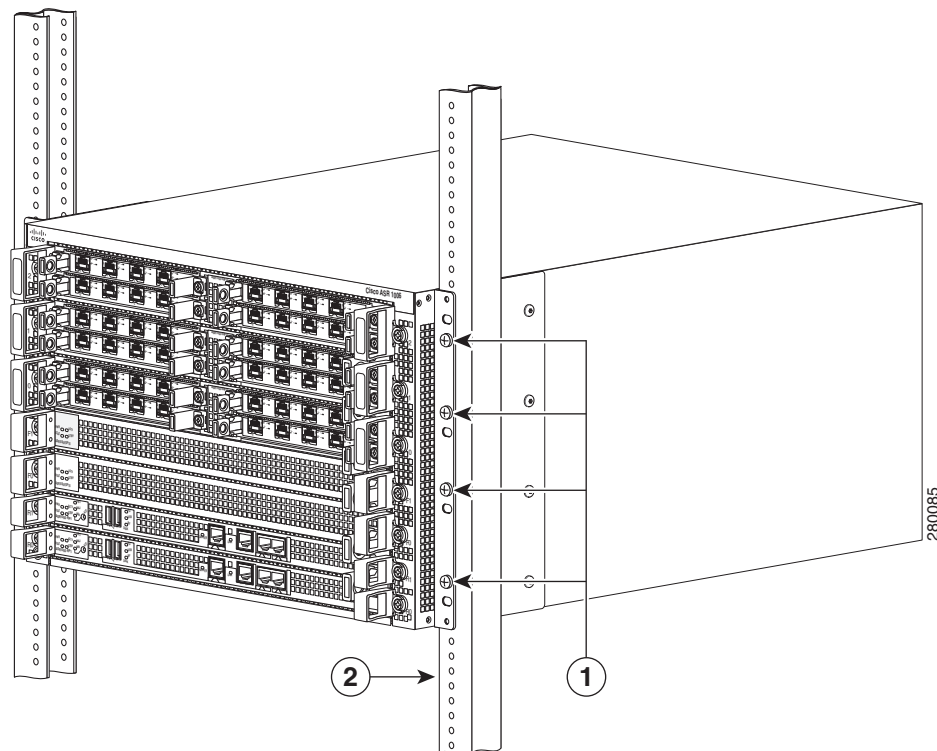
Step 8 Tighten all screws on each side to secure the chassis to the equipment rack.

You can install your Cisco AR1006 chassis in a two-post rack or a four-post rack. See the [“Two-Post Rack Installation”](#) section on page 4-13 and the four-post rack installation, go to the [“Four-Post Rack Installation”](#) section on page 4-14.

Two-Post Rack Installation

The Cisco ASR 1006 Router can be installed in a two-post rack, either 19 inch or 23 inch.

Figure 4-8 *Installing the Cisco ASR 1006 Router in a Two-Post Equipment Rack*



1	Cisco ASR1006 Router front rack-mount bracket	2	Two-post equipment rack rail
----------	---	----------	------------------------------

**Note**

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26cm). The height of the chassis is 10.45 inches (26.543 cm). Airflow through the chassis is from front to back.

**Caution**

If you are using a two-post rack secure the rack to the floor surface to prevent tipping and avoid bodily injury and component damage.

-
- Step 1** Position the chassis so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.
- Step 2** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 3** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 4** For each bracket, insert and tighten two screws to the rack on both sides.

**Note**

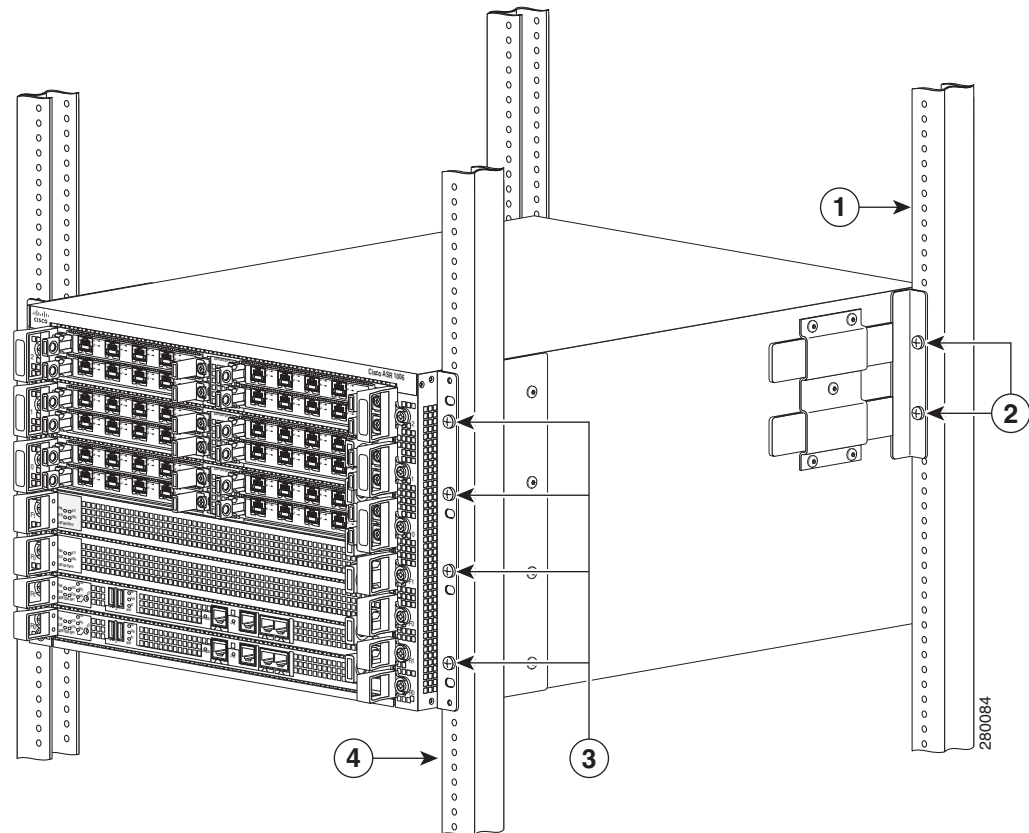
Use the third hole up from the bottom of the rack-mount bracket and the third hole down from the top of the rack-mount bracket. See [Figure 4-10](#) for position and location of the ear holes on the rack-mount bracket.

This completes the procedure for installing the chassis in a two-post rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 4-17 to continue the installation.

Four-Post Rack Installation

The Cisco ASR 1006 Router can be flush-mounted in a 19-inch equipment rack using the rack-mounting kit provided with your system. The Cisco ASR 1006 Router can be mounted into the rack using two recommended methods:

- Installing the chassis in an existing rack with equipment.
- Installing an empty chassis in a rack with no equipment installed.

Figure 4-9 *Installing the Cisco ASR 1006 Router in a Four-Post Equipment Rack*

1	Four-post equipment rack rear rail	3	Cisco ASR1006 front rack-mount brackets
2	Cisco ASR1006 rear rack-mount brackets	4	Four-post equipment rack front rail

When handling the chassis, always follow proper lifting practices, see [Chassis-Lifting Guidelines](#), page 3-20.

**Note**

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26cm). The height of the chassis is 10.45 inches (26.543 cm). Airflow through the chassis is from front to back.

**Note**

Make sure the rack is stabilized.

- Step 1** (Optional) Install a shelf in the rack to support the Cisco ASR 1006 Router. If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis. Using two people, lift the chassis into the rack using the side handles and grasping underneath the power supply bays.
- Step 2** Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

**Note**

Use the third hole up from the bottom of the rack-mount bracket and the third hole down from the top of the rack-mount bracket. See [Figure 4-10](#) for position and location of the ear holes on the rack-mount bracket.

- Step 3** Hold the chassis in position against the mounting rails while the second person finger-tightens a screw to the rack rails on each side of the chassis.
- Step 4** Finger-tighten 4 more screws to the rack rails on each side of the chassis.
- Step 5** Tighten all screws on each side to secure the chassis to the equipment rack.
- Step 6** Use a level to verify that the tops of the two brackets are level, or use a measuring tape to verify that both brackets are the same distance from the top of the rack rails.

This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching the Cable-Management Bracket”](#) section on page 4-16 to continue the installation.

Attaching the Cable-Management Bracket

The cable-management brackets mount to each rack-mount bracket on the chassis to provide cable-management to both sides of the chassis (parallel with card orientation). These brackets are screw mounted to the rack-mount brackets to allow easy installation and removal of cables.

The cable-management brackets for the Cisco ASR 1006 Router contain 5 independent cable-management “U” type features with four screws and provides cable dressing of each card module slots. For Cisco ASR 1000 SIPs, these brackets work in tandem with shared port adapter product feature cable-management device to allow installation and removal of adjacent cards without the need to remove cables.

**Note**

Make certain that the cable-management bracket “U” type feature is facing upwards when you attach it to the chassis.

Follow these steps to attach the cable-management brackets to both sides of the Cisco ASR 1006 Router in the rack:

- Step 1** Align the cable-management bracket to the rack-mount bracket on one side of the Cisco ASR 1006 Router. The cable-management bracket aligns to the top hole of the chassis rack-mount bracket.
- Step 2** Using a Phillips screwdriver, insert the screw through cable-management bracket and into the chassis rack-mount and tighten the screw.

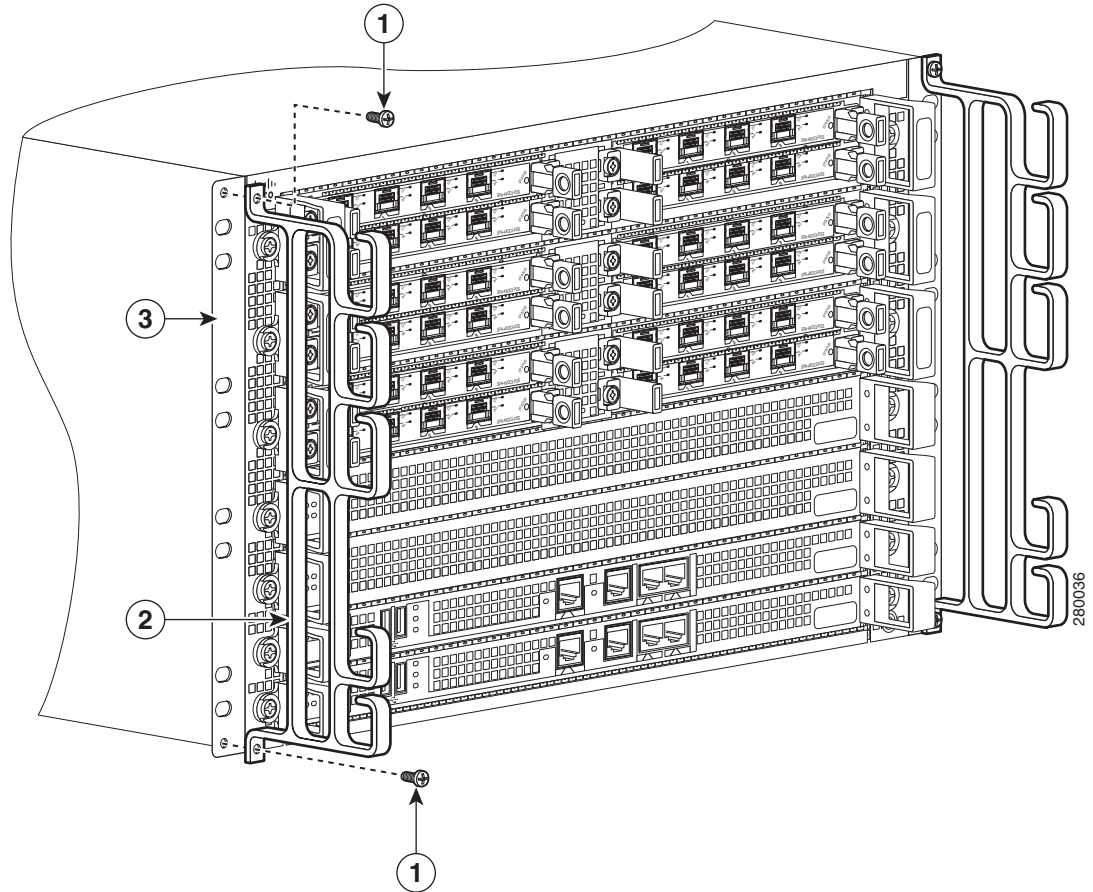
**Note**

Use the package of screws that came with your chassis containing four screws.

- Step 3** Using the bottom rack-mount ear hole, insert the screw through cable-management bracket and into the chassis rack-mount (see [Figure 4-10](#)).

Figure 4-10 shows the cable-management brackets attached to the chassis in a rack.

Figure 4-10 *Installing the Cable-Management Bracket*



1	Cable-management bracket screw location	3	Chassis front rack-mount bracket and ear holes
2	Cable-management bracket		

This completes the procedure for installing the cable-management brackets on the chassis.

Attaching a Chassis Ground Connection

Connecting the Cisco ASR 1006 Router chassis to earth ground is required for all DC powered installations and any AC powered installation where compliance with Telcordia grounding requirements is necessary.



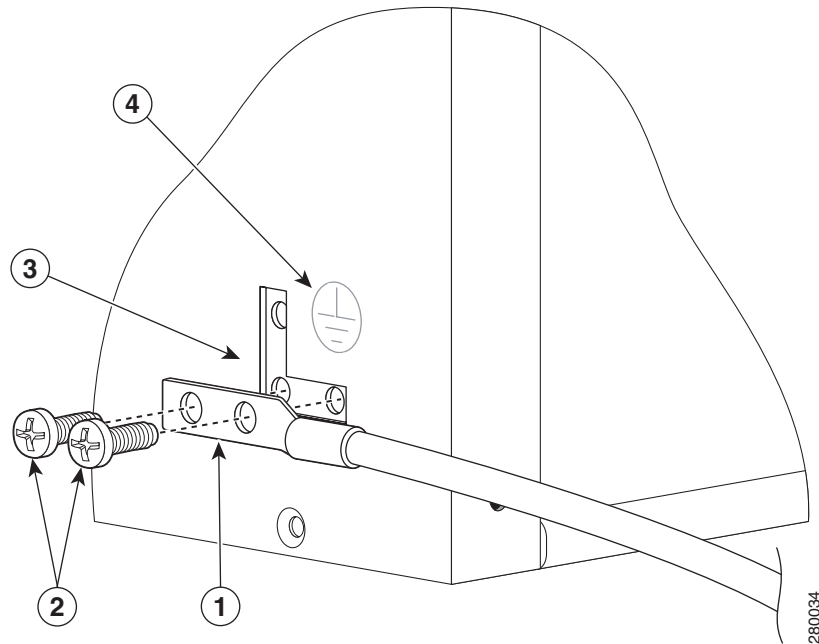
Caution

The dual-lug chassis stud must be installed, the SIP and SPA must be fully inserted and screwed in and earthed to prevent a potential hazard in a telecom line.

Have the recommended tools and supplies available before you begin this procedure.

Figure 4-11 shows the cable-management brackets attached to the chassis in a rack.

Figure 4-11 Installing the Cisco ASR 1006 Router Ground Connection



1	Chassis earth ground studs and lead wire	3	Earth ground connector on the chassis
2	Grounding screws	4	Earth ground symbol



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Before you connect power or turn on power to your chassis, you must provide an adequate chassis ground (earth) connection for the chassis. A chassis ground connector is provided on each Cisco ASR 1006 Router. There is a stud on the side of the chassis and on the DC power supply (primary grounding stud).



Caution

The grounding wire is always the first to be installed or connected and the last to be removed or disconnected.

Recommended Tools and Supplies

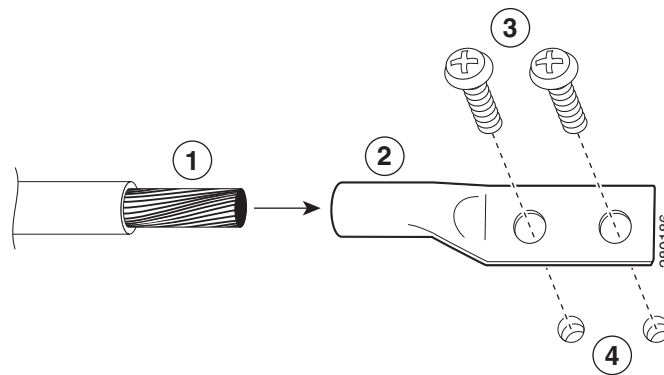
The following tools, equipment, and supplies necessary to connect the system ground to the chassis:

- Phillips screwdriver
- Dual-lug chassis ground component
- Grounding wire

Use the following procedure to attach the grounding lug to the chassis ground connector on your chassis:

-
- Step 1** Use the wire stripper to strip one end of the AWG #6 wire approximately 0.75 inches (19.05 mm).
- Step 2** Insert the AWG #6 wire into the wire receptacle on the grounding lug.
- Step 3** Use the crimping tool to carefully crimp the wire receptacle around the wire; this step is required to ensure a proper mechanical connection.
- Step 4** Attach the grounding lug with the wire so that the grounding wire does not overlap the power supply.
-

Figure 4-12 Attaching a Grounding Lug to the Chassis Ground Connector



1	Chassis ground lead wire	3	Ground screws
2	Grounding stud	4	Chassis ground connector holes

- Step 5** Locate the chassis ground connector on the side of your chassis.
- Step 6** Insert the two screws through the holes in the grounding lug.
- Step 7** Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not overtighten the screws.
- Step 8** Connect the opposite end of the grounding wire to the appropriate grounding point at your site to ensure an adequate chassis ground.
-

This completes the procedure for attaching a chassis ground connection. Go to the following cabling sections for information on attaching cables.

Connecting Shared Port Adapter Cables

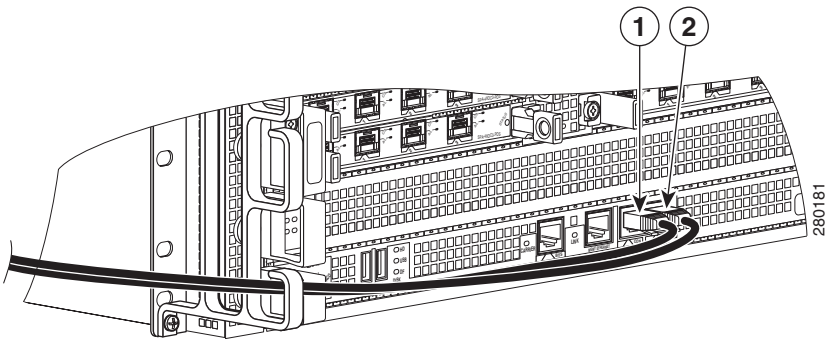
The instructions for connecting the cables for the shared port adapter installed in the Cisco ASR 1006 Router are contained in the respective configuration documents for each port adapter. For example, if you are connecting the optical fiber cables for the PA-POS-OC3 port adapter, refer to the configuration note *PA-POS-OC3 Packet OC-3 Port Adapter Installation and Configuration Guide* at <http://www.cisco.com/univercd/cc/td/doc/product/core>

Shared port adapter documents are also available on the Cisco Documentation DVD.

Connecting Console and Auxiliary Port Cables

The Cisco ASR 1006 Router has a DCE-mode console port for connecting a console terminal and a DTE-mode auxiliary port for connecting a modem or other DCE device (such as another router) to your chassis. [Figure 4-13](#) shows the CON and AUX ports on the Cisco ASR 1000 Series RP1 route processor card.

Figure 4-13 Cisco ASR 1000 Series RP1—CON and AUX Ports



1	CON connector	2	AUX connector
---	---------------	---	---------------


Note

Both the console and the auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco ASR 1006 Router uses RJ-45 ports for both the auxiliary port and the console port.

For console and auxiliary port pinouts for the RJ-45 connector, see [Appendix A, “Cisco ASR 1006 Router Specifications.”](#) Both ports are configured as asynchronous serial ports.

- Step 1** Before connecting a terminal to the console port, configure the terminal to match the chassis console port as follows: 9600 baud, 8 data bits, no parity, 1 stop bits (9600 8N1).
- Step 2** After you establish normal router operation, you can disconnect the terminal.

Connecting the Ethernet Management Port Cable

When using the Fast Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Fast Ethernet Management port is configured to a fixed speed (10 or 100 Mbps) through command-line interface (CLI) commands, the port is forced to MDI mode.

When in a fixed-speed configuration and MDI mode:

- Use a crossover cable to connect to an MDI port
- Use a straight-through cable to connect to an MDI-X port

Connecting Power to Cisco ASR 1006 Router



Warning

The covers are an integral part of the safety design of the product. Do not operate the unit without the covers installed. Statement 1077



Warning

When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

This section provides the procedures for connecting AC-input and DC-input power to your Cisco ASR 1006 Router.

The DC power supply for the Cisco ASR 1006, ASR 1004, and ASR 1002 routers operate at individual specifications. [Table 4-2](#) shows the common input ranges and circuit breaker requirements.

Table 4-2 Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps		AWG # Wire	
		Minimum	Maximum	Minimum	Maximum
Cisco ASR 1006	40	Always 50		Always AWG #6 wire	
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20Amp circuit breaker and an AWG #10 gauge wire for a 30Amp circuit breaker.



Note

All Cisco ASR 1000 Series Router AC power supplies require a 20 AMP circuit breaker.



Note

Detailed instructions for removing and replacing the Cisco ASR1000 Series AC and DC power supplies are in [Removing and Replacing a Cisco ASR 1006 Router Power Supply, page 8-22](#).

Connecting AC-Input Power to Cisco ASR 1006 Router

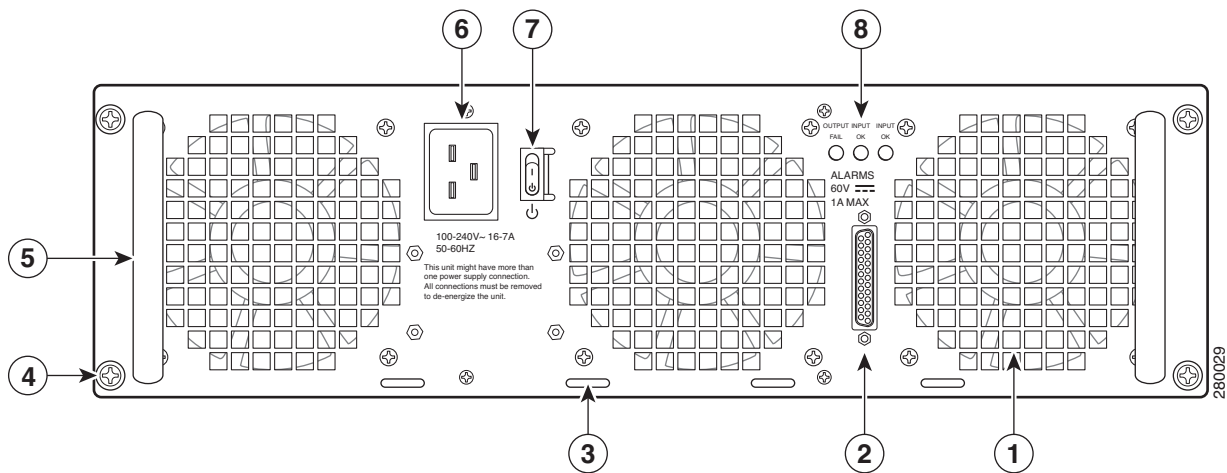
Follow these steps to connect an AC-input power supply to the Cisco 1006 chassis:

- Step 1** At the rear of the chassis, check that the power switch on the power supply is in the Standby position.
- Step 2** Plug the power cable into the inlet.



Note

For additional AC power cable strain relief, secure the cable to the power supply handle by inserting a nylon cable tie through the hole in the handle and around the cable.

Figure 4-14 Cisco ASR 1006 Router AC Power Supply Power Inlet and Standby Switch

1	AC power supply fan	5	AC power supply handle
2	DB-25 alarm connector	6	AC power inlet
3	Tie-wrap tab	7	AC power supply Standby switch
4	AC power supply captive screw	8	AC power supply LEDs

Step 3 Plug the AC power supply cable into the AC power source.

This completes the procedure for connecting AC-input power.

Connecting DC-Input Power to Cisco ASR 1006 Router

This section describes how to connect the DC power supply into the Cisco ASR 1006 Router.

Before you begin, read these important notices:

- The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground (GND), black is used for -48V on negative (-) terminal and red is used for RTN on the positive (+) terminal. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.
- For DC input power cables, select the appropriate wire gauge based on the National Electrical Code (NEC) and local codes for 40-amp service at nominal DC input voltage (-48/-60 VDC). Three pairs of cable leads, source DC (-) and source DC return (+), are required for each power distribution unit (PDU). These cables are available from any commercial cable vendor. All input power cables for the chassis should have the same wire gauge and cable lengths should match within 10 percent of deviation.

Each DC input power cable is terminated at the PDU by a cable lug. The cable lugs must be dual-hole, and have a straight tongue. They must be able to fit over 1/4-inch terminal studs at 0.625-inch (15.88-mm) centers.

**Note**

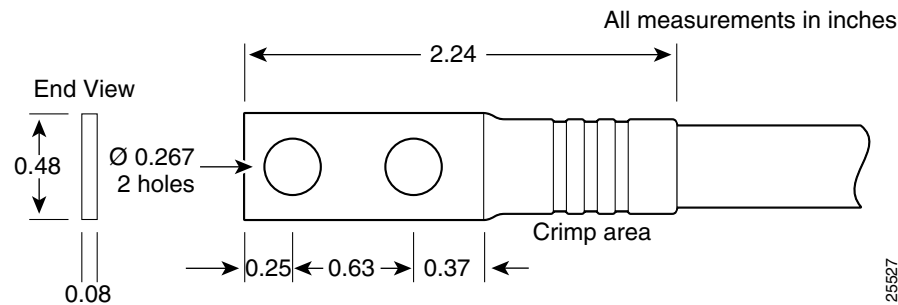
DC input power cables must be connected to the PDU terminal studs in the proper positive (+) and negative (–) polarity. In some cases, the DC cable leads are labeled, which is a relatively safe indication of the polarity. However, you must verify the polarity by measuring the voltage between the DC cable leads. When making the measurement, the positive (+) lead and the negative (–) lead must always match the (+) and (–) labels on the power distribution unit.

- An earth ground cable is required for each DC PDU. We recommend that you use at least 6-AWG multistrand copper wire. This wire is not available from Cisco Systems; it is available from any commercial cable vendor.

The ground wire cable lug should be dual-hole (as shown in [Figure 4-15](#)) and able to fit over M6 terminal studs at 0.625 inch (15.88mm) centers. Recommended lug terminal wire size Panduit part number:

- LCD8-14A-L for 8AWG wire size
- LCD6-14A-L for 6AWG wire size

Figure 4-15 DC Input Power Cable Lug

**Note**

To avoid hazardous conditions, all components in the area where DC input power is accessible must be properly insulated. Therefore, before installing the DC cable lugs, be sure to insulate the lugs according to the manufacturer's instructions.

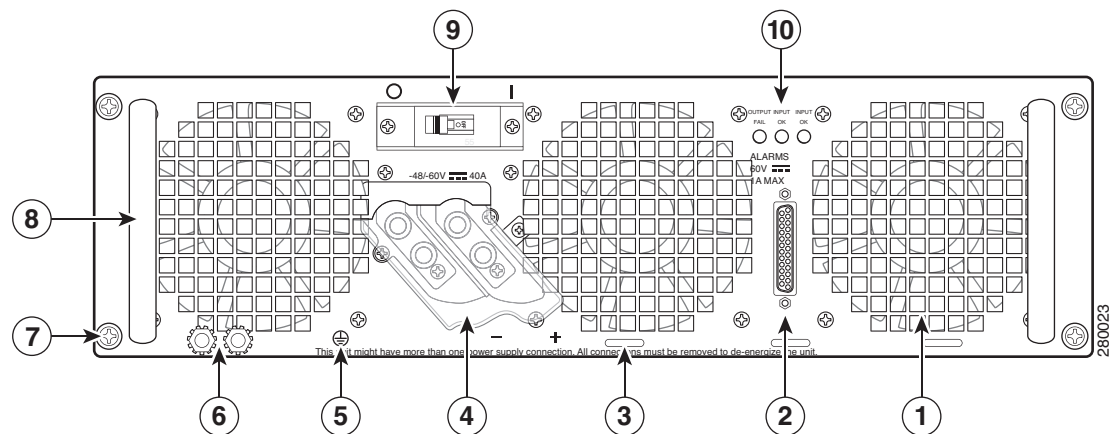
**Warning**

When you install the unit, the ground connection must always be made first and disconnected last.
Statement 1046

To connect the DC power supply, follow these steps:

- Step 1** Make certain that the chassis grounding is connected before you begin installing the DC power supply.
- Step 2** Locate the stud on the DC power supply for the **GND** connection which must be connected first and follow these steps:
- Using the grounding lug, replace the washers and Kepnut screw in the following order.
 - Flat washer
 - Grounding cable lug
 - Kepnut screw
 - Tighten the Kepnut screws on the power supply studs.

Figure 4-16 Cisco ASR 1006 Router DC Power Supply



1	Fans	6	DC Power supply earth ground lugs
2	DB-25 alarm connector	7	DC Power supply captive screws
3	Tie-wrap tabs	8	DC Power supply handle
4	DC power supply terminal and plastic cover	9	DC power supply On (I) /Off (O) switch
5	Earth grounding symbol	10	DC power supply LEDs

Step 3 Attach the other end of the cable to the site's ground connection.

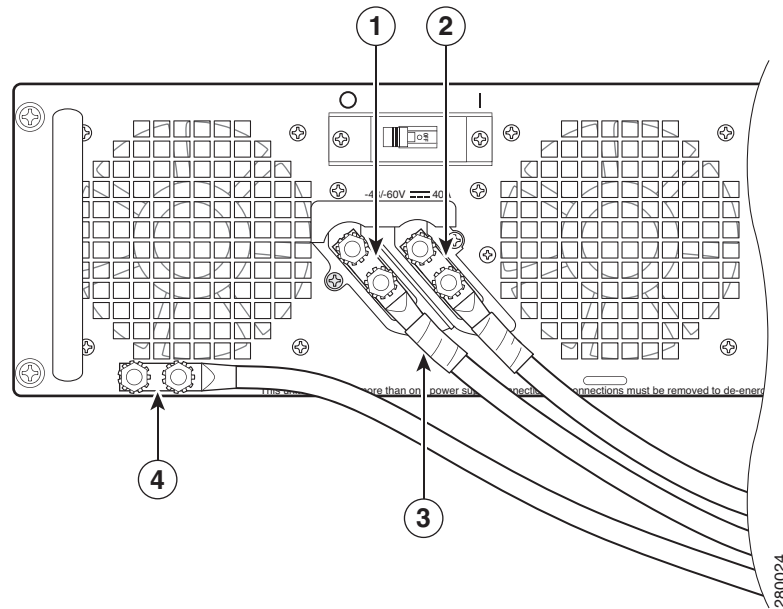
Step 4 Remove the plastic cover from the terminal block.



Caution

Before you continue to install the terminal block ground wires, stop and perform Step 5. To prevent any contact with metal lead on the ground wire and the plastic cover.

Step 5 You must wrap the positive and negative lead cables with sleeving. Take each lead wire and cover the area from the lug to the wire with heavy shrink sleeving (see [Figure 4-17](#)).

Figure 4-17 DC Power Supply Terminal Block Ground Cable Lugs

1	Negative lug and wire with sleeving wrapped around the wire and end of lug	3	Location of sleeving wrapped around the wire and end of the grounding stud
2	Positive lug and wire with sleeving wrapped around the wire and end of lug	4	Earth ground lug and wire

Step 6 For easier cable-management, insert the negative lead cable first. Replace the ground lug with cable in the following order:

- a. Flat Washer
- b. Ground lug with negative wire
- c. Kepnut screw

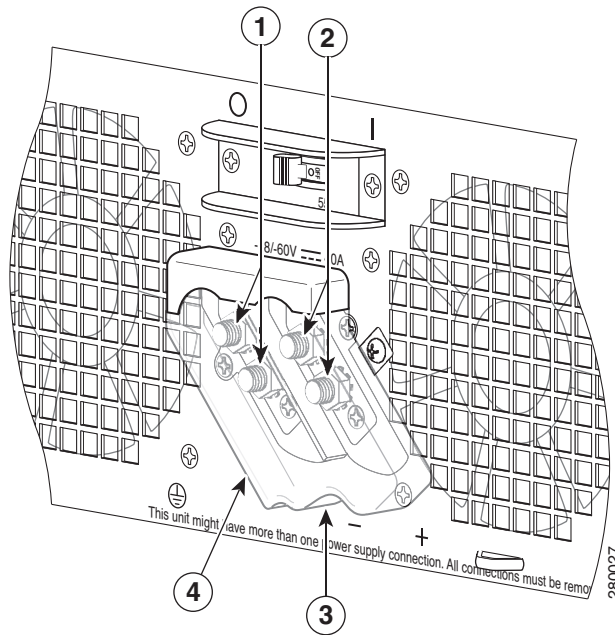
Step 7 Tighten the Kepnut screw to recommended torque of 18 in-lbs minimum to 22 in-lbs maximum for the positive stud and wire.



Note Secure the wires coming in from the terminal block so that they cannot be disturbed by casual contact.

Step 8 Use tie wraps to secure the wires, so that the wires are not pulled from the terminal block by casual contact. Tie-wrap studs are located below the power supply terminal block (see [Figure 4-18](#)).

Step 9 Replace the terminal block plastic cover and tighten the screw. The plastic cover is slotted and keyed to fit correctly over the terminal block.

Figure 4-18 Cisco ASR 1006 Router DC Power Supply Terminal Block Plastic Cover

1	Negative lead	3	Plastic cover slotted area
2	Positive lead	4	Terminal block plastic cover

- Step 10** Remove the tape from the circuit-breaker switch handle and move the circuit-breaker handle to the on position.
- Step 11** Switch the circuit breaker switch to the On (I) position.

This completes the procedure for connecting the DC power supply in the Cisco ASR 1006 Router.

Connecting a Terminal to the Cisco ASR 1000 Series RP1 Console Port

The Cisco ASR 1006 router processor has an asynchronous serial (EIA/TIA-232) RJ-45 console port labeled CON on its front panel. You can connect this port to most types of video terminals through use of the console cable kit that is included with your Cisco ASR 1006 Router. The console cable kit contains:

- One RJ-45 to RJ-45 crossover cable
- One RJ-45 to DB-25 (female) adapter
- One RJ-45 to DB-9 (female) adapter

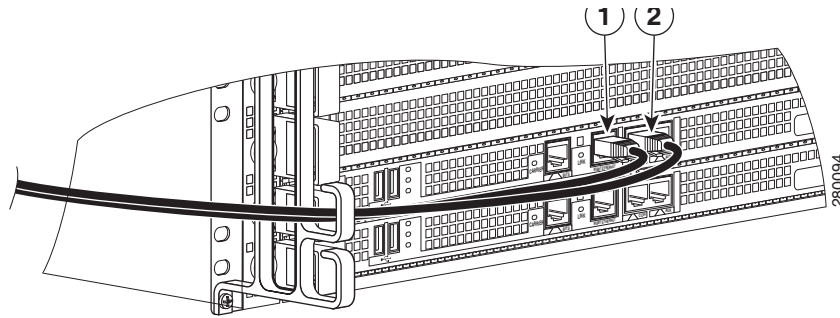
A crossover cable reverses pin connections from one end to the other. In other words, it connects pin 1 (at one end) to pin 8 (at the other end), pin 2 to pin 7, pin 3 to pin 6, and so on. You can identify a crossover cable by comparing the two modular ends of the cable. Hold the cable ends in your hand, side-by-side, with the tabs at the back. Ensure that the wire connected to the outside (left) pin of the left plug (pin 1) is the same color as the wire connected to the outside (right) pin of the right plug (pin 8).

Use the following procedure to connect a video terminal to the console port on a route processor.

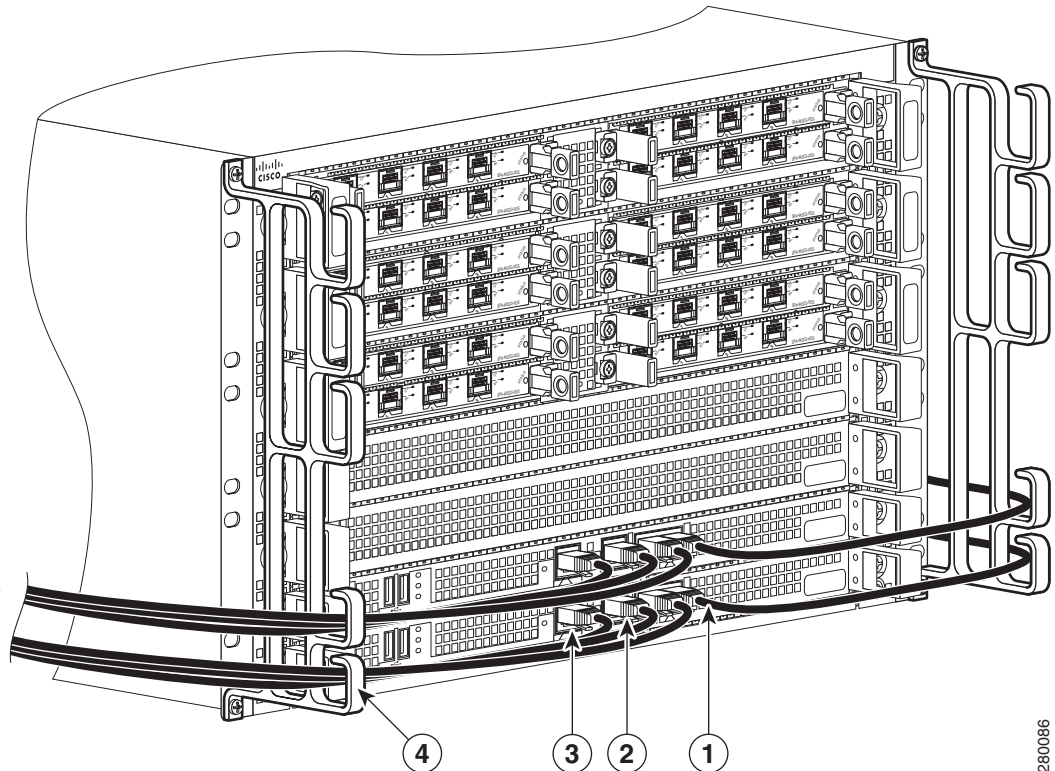
**Note**

Each Cisco ASR 1000 Series Route Processor 1 must have a console port connection (typically to a terminal server) if you are running a redundant configuration in the chassis.

Figure 4-19 Console Port and Auxiliary Port Connection on the ASR 1000 Series RP1



- Step 1** Connect one end of the RJ-45 cables to the serial RJ-45 port (CON) on the Cisco ASR 1000 Series Route Processor 1 (Figure 4-19).
- Step 2** Run the cable up and through the cable-management bracket and connect the other end of the RJ-45 cable to the RJ-45 adapter (Figure 4-20).

Figure 4-20 Cable-Management Bracket with Cabling in the Cisco ASR 1006 Router

1	AUXiliary connection	3	BITS port
2	MGMT Ethernet port	4	Cable-management U feature device

- Step 3** Connect the adapter to your video terminal to complete the cable connection.
- Step 4** Power on your video terminal.
- Step 5** Configure your video terminal to match the following default console port settings: 9600 baud, 8 data bits, No parity generation or checking, 1 stop bit, and No flow control.
- Step 6** Go to the [“Connecting System Cables”](#) section on page 4-29 to continue the installation.

Connecting System Cables

Keep the following guidelines in mind when connecting external cables to the Cisco ASR 1006 Router:

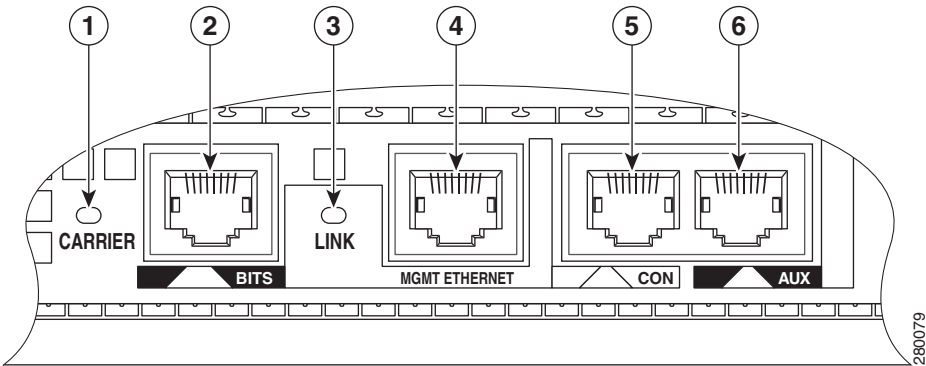
- To reduce the chance of interference, avoid crossing high-power lines with any interface cables.
- Verify all cabling limitations (particularly distance) before powering on the system.

Auxiliary Connection

This asynchronous EIA/TIA-232 serial port (AUX) is used to connect a modem to the Cisco ASR 1000 Series Route Processor 1 for remote administrative access. Use the following procedure to connect the Cisco ASR 1006 Router to a modem.

- Step 1
- Connect one end of the modem cable to the RJ-45 port on the primary Cisco ASR 1000 Series Route Processor 1, labeled AUX.

Figure 4-21 Cisco ASR 1000 Series RP1 Port Connectors and LEDs



1	AUX port	4	LINK LED
2	CON port	5	BITS port
3	MGMT Ethernet port	6	CARRIER LED

- Step 2
- Run the cable up and through the cable-management bracket U feature device as shown in [Figure 4-20](#) and connect the other end of the cable to your modem.

If you have completed all cable connections, go to, [Chapter 7, “Cisco ASR 1000 Series Routers Power Up and Initial Configuration.”](#)



CHAPTER 5

Cisco ASR 1004 Router Overview and Installation

This chapter describes the Cisco ASR 1004 Router and the procedures for installing the Cisco ASR 1004 Router on an equipment shelf or tabletop or in equipment racks. It also describes how to connect interface and power cables.

This chapter contains the following sections:

- [Cisco ASR 1004 Router Description, page 5-1](#)
- [General Rack Installation Guidelines, page 5-5](#)
- [Guidelines for an Equipment Shelf or Tabletop Installation, page 5-6](#)
- [Equipment Shelf or Tabletop Installation, page 5-7](#)
- [Rack-Mounting a Cisco ASR 1004 Router, page 5-9](#)
- [Attaching a Chassis Ground Connection, page 5-16](#)
- [Connecting Power to Cisco ASR 1004 Router, page 5-22](#)
- [Connecting a Terminal to the Cisco ASR Series 1000 RP1 Console Port, page 5-29](#)
- [Connecting Network Management and Signal System Cables, page 5-30](#)



Warning

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071



Warning

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco ASR 1000 Series Aggregation Services Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

Cisco ASR 1004 Router Description

The Cisco ASR 1004 Router system consists of the following system level components:

- Two Cisco ASR 1000 Series SPA Interface Processor (SIP)
- One Cisco ASR 1000 Series Embedded Services Processor (Cisco ASR 1000-ESP10 or Cisco ASR 1000-ESP20)

- One Cisco ASR 1000 Series Route Processor 1 (RP1)
- Dual (redundant) AC and DC power supplies

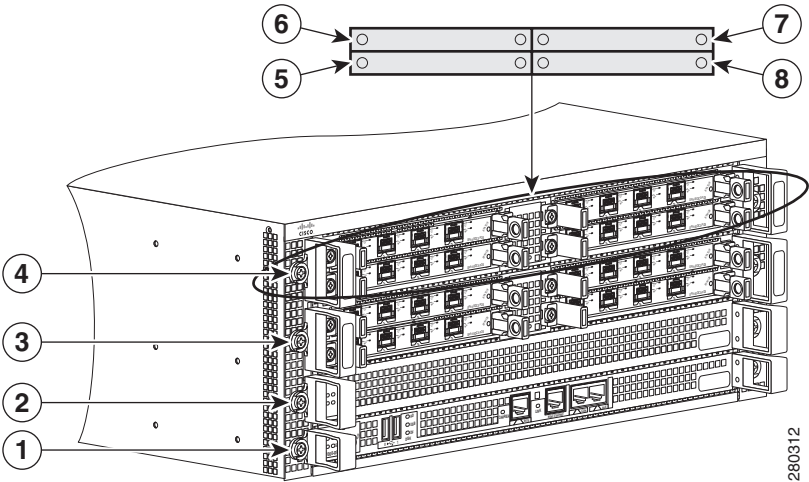
This section contains the following topics:

- [Front View, page 5-2](#)
- [Rear View, page 5-3](#)

Front View

Figure 5-1 shows the Cisco ASR 1004 Router with modules and filler plates installed.

Figure 5-1 Cisco ASR 1004 Router –Front and Side View

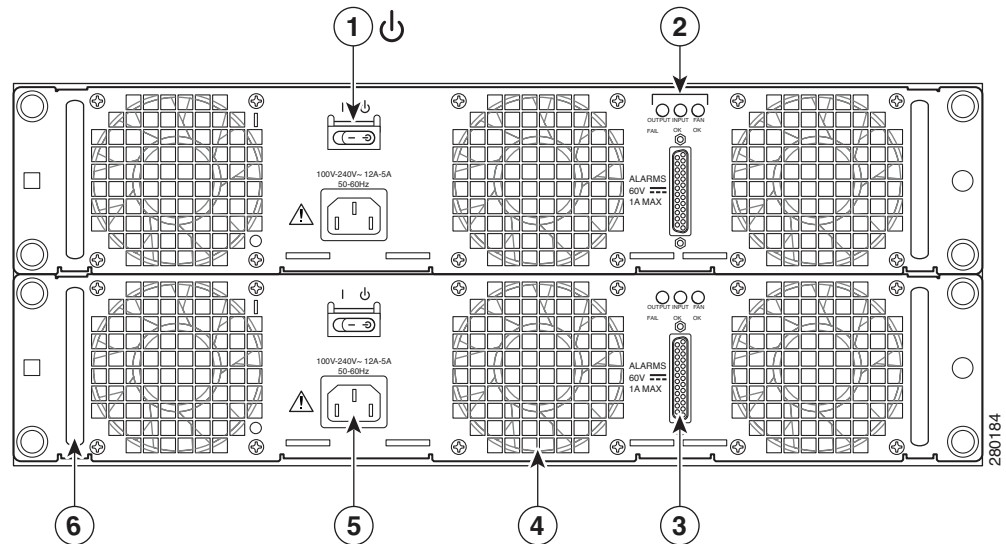


1	Slot RP0 with ASR 1000 Series RP1	5	SPA subslot 2
2	Slot FP0 with a Cisco ASR1000-ESP10 or Cisco ASR1000-ESP20	6	SPA subslot 0
3	ASR 1000 Series SIP slot 0	7	SPA subslot 1
4	ASR 1000 Series SIP slot 1	8	SPA subslot 3

Rear View

Figure 5-2 shows the rear of the Cisco ASR 1004 Router with two AC power supplies installed.

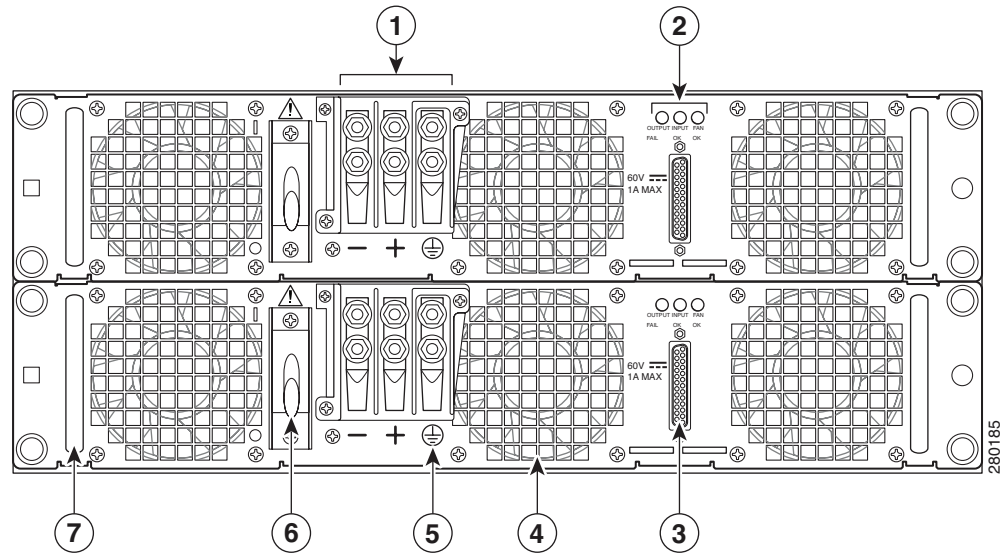
Figure 5-2 Cisco ASR 1004 Router Rear View With AC Power Supply



1	AC power supply Standby switch	4	AC power supply fan
2	AC power supply LEDs	5	AC power inlet
3	AC power supply DB-25 alarm connector	6	AC power supply handle

Figure 5-3 shows the rear of the Cisco ASR 1004 Router with two DC power supplies installed.

Figure 5-3 Cisco ASR 1004 Router Rear View With DC Power Supplies



1	DC power supply terminal block	5	Earth grounding symbol
2	DC power supply LEDs	6	DC power supply On/Off switch
3	DC power supply DB-25 alarm connector	7	DC power supply handle
4	DC power supply fan		

Internal fans draw cooling air into the chassis and across internal components to maintain an acceptable operating temperature. (See Figure 5-2.) The fans are located at the rear of the chassis. A two-hole grounding lug is located on the side of the chassis. Two power supplies, either two AC power supplies or two DC power supplies, are accessed from the rear of the router.


Note

You have already unpacked your chassis and read all the site requirements for your new equipment. Proceed with the installation.


Note

Do not combine AC and DC power supplies in the same chassis.


Warning

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.
Statement 1071

**Warning**

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco ASR 1000 Series Aggregation Services Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

**Note**

You have already unpacked your chassis and read all the site requirements for your new equipment. Proceed with the installation.

Installation Methods

Although rack-mounting is the preferred method of installation for the Cisco ASR 1004 Router, you can mount the chassis:

- On an equipment shelf or tabletop
- In a 19-inch wide (standard), 4-post equipment rack or two-post, using the rack-mount brackets in the accessory kit

**Note**

The Cisco ASR 1004 Router usually ships fully loaded. However, you can remove components from the chassis to make the chassis lighter for your rack installation.

General Rack Installation Guidelines

When planning your rack installation, consider the following guidelines:

- The Cisco ASR 1004 Router requires a minimum of 4 rack units (7 inches or 17.8 cm) of vertical rack space. Measure the proposed rack location before mounting the chassis in the rack.
- Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rack-mount installation, remove the power strip before installing the chassis, and then replace it after the chassis is installed.
- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or moving cards, connecting cables, or replacing or upgrading components). Otherwise, allow 19 inches (48.3 cm) of clearance to remove field-replaceable units.
- Maintain a minimum clearance of 3 inches (7.62 cm) on the front, top, and sides of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the chassis in an overly congested rack or directly next to another equipment rack; otherwise, the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.

**Caution**

To prevent chassis overheating, never install a Cisco ASR 1004 Router in an enclosed room that is not properly ventilated or air conditioned.

- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity to prevent the rack from falling over.

- Install and use the cable-management brackets included with the Cisco ASR 1004 Router to keep cables organized and out of the way of the cards and processors. Ensure that cables from other equipment already installed in the rack do not impair access to the cards or require you to disconnect cables unnecessarily to perform equipment maintenance or upgrades.
- Install rack stabilizers (if available) before you mount the chassis.
- Provide an adequate chassis ground (earth) connection for your router chassis.

In addition to the preceding guidelines, review the precautions for avoiding excessive temperature conditions in the [“Site Environmental Requirements” section on page 3-8](#).

[Table 5-1](#) provides the Cisco ASR 1004 Router dimensions and weight information.

Table 5-1 Cisco ASR 1004 Router Dimensions and Weight

Cisco ASR 1004	Dimensions
Depth	22.50 in. (57.15 cm) (including card handles, cable-management brackets, power supply handles).
Height	6.95 in. (17.653cm) (4 rack-mount per EIA RS-310)
Width	17.25 in. (43.815 cm) (19 inch rack-mount or optional 23 Telco rack mount)
Weight	50 pounds (fully configured) 22.6796 kg

Guidelines for an Equipment Shelf or Tabletop Installation

The chassis should already be in the area where you will install it. If you have not determined where to install your chassis, see [Cisco ASR 1000 Series Routers Components, page 2-1](#) for information about site considerations.

If you are not rack-mounting your Cisco ASR1000 series chassis, place it on a sturdy equipment shelf or tabletop.

When installing the Cisco ASR 1004 Router on an equipment shelf or tabletop, ensure that the surface is clean and that you have considered the following:

- The Cisco ASR 1004 Router requires at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents (the front and top/rear sides of the chassis).
- The Cisco ASR 1004 Router should be installed off the floor. Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.
- There must be approximately 19 inches (48.3 cm) of clearance at the front and rear of the chassis to install and replace FRUs, or to access network cables and equipment.
- The Cisco ASR 1004 Router needs adequate ventilation. Do not install it in an enclosed cabinet where ventilation is inadequate.

- Have the cable-management bracket available if you plan to install it on the front of the chassis.
- An adequate chassis ground (earth) connection exists for your router chassis (see the “[Attaching a Chassis Ground Connection](#)” section on page 5-16).
- Always follow proper lifting practices as outlined in the “[Electrical Safety](#)” section on page 3-18, when handling the chassis.

Equipment Shelf or Tabletop Installation

To mount your Cisco ASR 1004 Router on an equipment shelf or tabletop, follow these steps.

Step 1 Remove any debris and dust from the tabletop or platform, as well as the surrounding area.

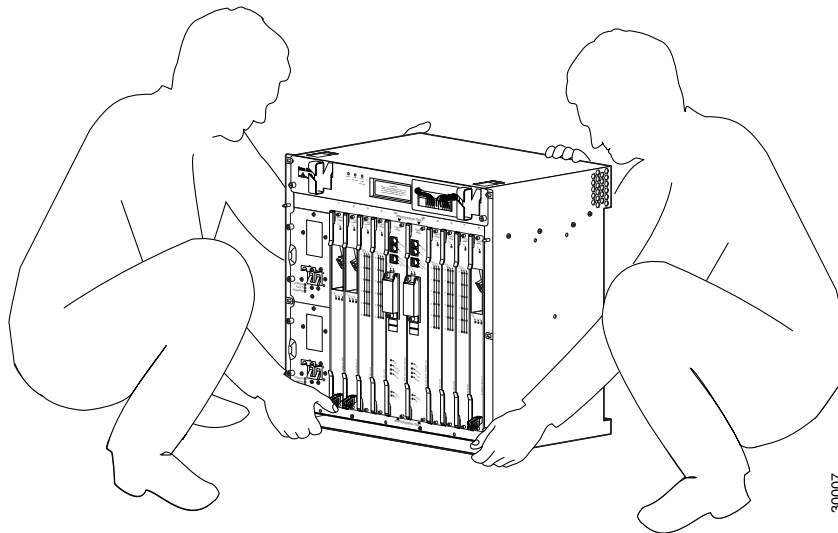
Step 2 Lift the chassis into position on the equipment shelf or tabletop.



Warning

At least two people are required to lift the chassis onto a tabletop or platform. To prevent injury, keep your back straight and lift with your legs, not your back. Statement 164

Figure 5-4 *Lifting the Chassis*



Note

The chassis in [Figure 5-4](#) does not represent the Cisco ASR 1004 Router. This is only an example of how to lift a Cisco chassis.

Step 1 Attach the front rack-mount brackets. Locate the threaded holes in the front sides of the chassis (first holes beyond the vent holes) and use the package of black screws that shipped with the chassis.

Step 2 Align the front rack-mount bracket to one side of the chassis.

Step 3 Insert and tighten the screws on one side.

Step 4 Repeat Step 2 through Step 3 on the other side of the chassis. Use all the screws to secure the rack-mount brackets to the chassis.



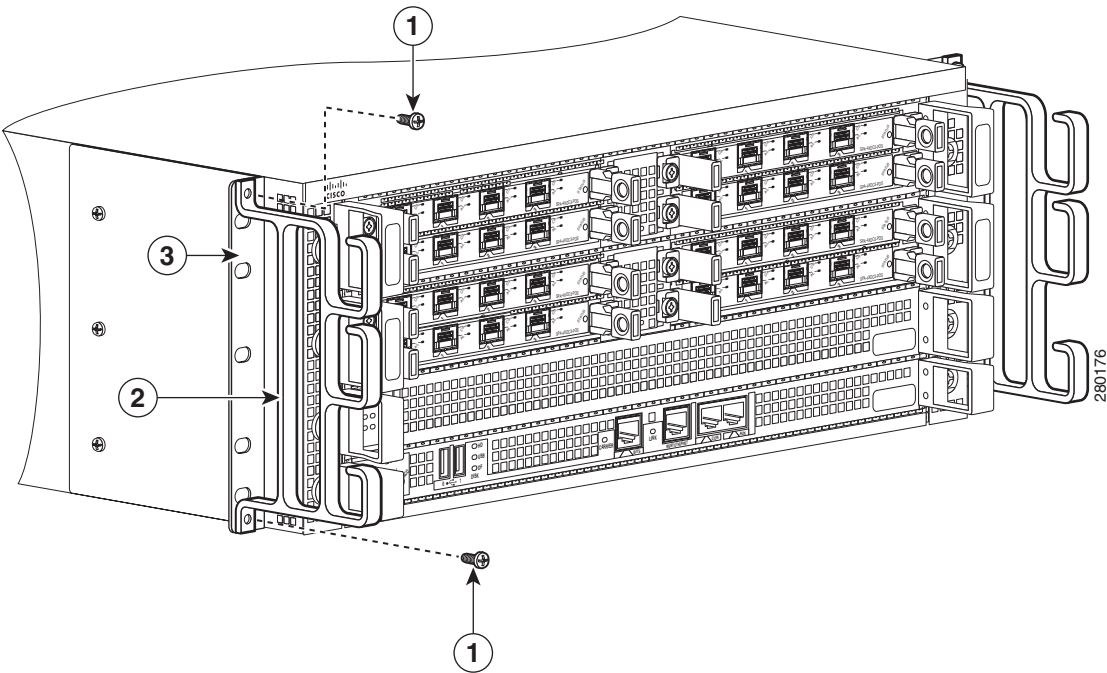
Note The cable-management brackets are installed on the chassis after you install the chassis rack-mount brackets and mount the chassis in the rack.

Step 5 Obtain the two cable-management brackets and screws shipped with your chassis. [Figure 5-5](#) shows attached cable-management brackets on the front of the Cisco ASR 1004 Router.



Note Make certain that the cable-management ‘U’ feature device has the open end pointing upwards when you attach it to the chassis after the chassis is installed in a rack.

Figure 5-5 Attaching the Cable-Management Brackets to the Cisco ASR 1004 Router



1	Cable-management bracket screws	3	Chassis front rack-mount bracket ear
2	Cable-management bracket		

Step 6 Screw the cable-management bracket to each side of the rack-mount brackets already attached to the chassis. Use two screws for each cable-management bracket. Use the package of four screws.

Step 7 Check that all screws are securely tightened.

You have completed a tabletop or equipment shelf chassis installation. Go to the [“Attaching a Chassis Ground Connection”](#) section on [page 5-16](#) to continue the installation

Rack-Mounting a Cisco ASR 1004 Router

The Cisco ASR 1004 Router can be installed with both front or rear rack-mount brackets.



Note

The chassis rack-mounting flanges are secured directly to the chassis before you lift it into the rack.

Verifying Rack Dimensions

Before you install the chassis, measure the space between the vertical mounting flanges (rails) on your equipment rack to verify that the rack conforms to the measurements shown in [Figure 5-6](#).

Step 1 Mark and measure the distance between two holes on the left and right mounting rails.

The distance should measure 18.31 inches \pm 0.06 inches (46.5 cm \pm 0.15 cm).



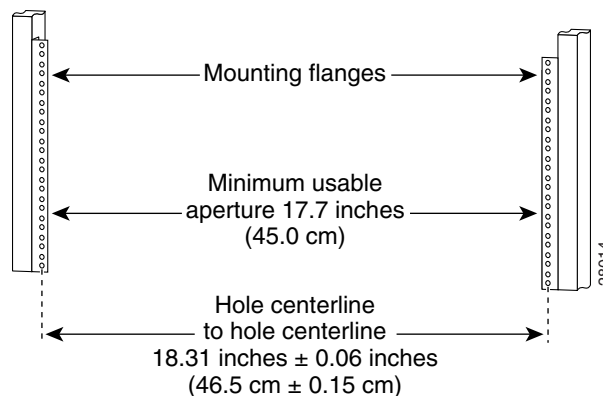
Note

Measure for pairs of holes near the bottom, middle and top of the equipment rack to ensure that the rack posts are parallel.

Step 2 Measure the space between the inner edges of the left front and right front mounting flanges on the equipment rack.

The space must be at least 17.7 inches (45 cm) to accommodate the chassis which is 17.25 inches (43.8 cm) wide and fits between the mounting posts on the rack.

Figure 5-6 Verifying Equipment Rack Dimensions



Attaching the Chassis Rack-Mount Brackets

This section explains how to attach the front and rear rack-mount brackets to the chassis. Before installing the chassis in the rack, you must install the rack-mount brackets on each side of the chassis.

The parts and tools required for installing the rack-mount brackets and cable-management brackets are listed in the “Tools and Equipment” section on page 3-21.



Note

The cable-management brackets are installed on the chassis after you install the chassis rack-mount brackets and mount the chassis in the rack.

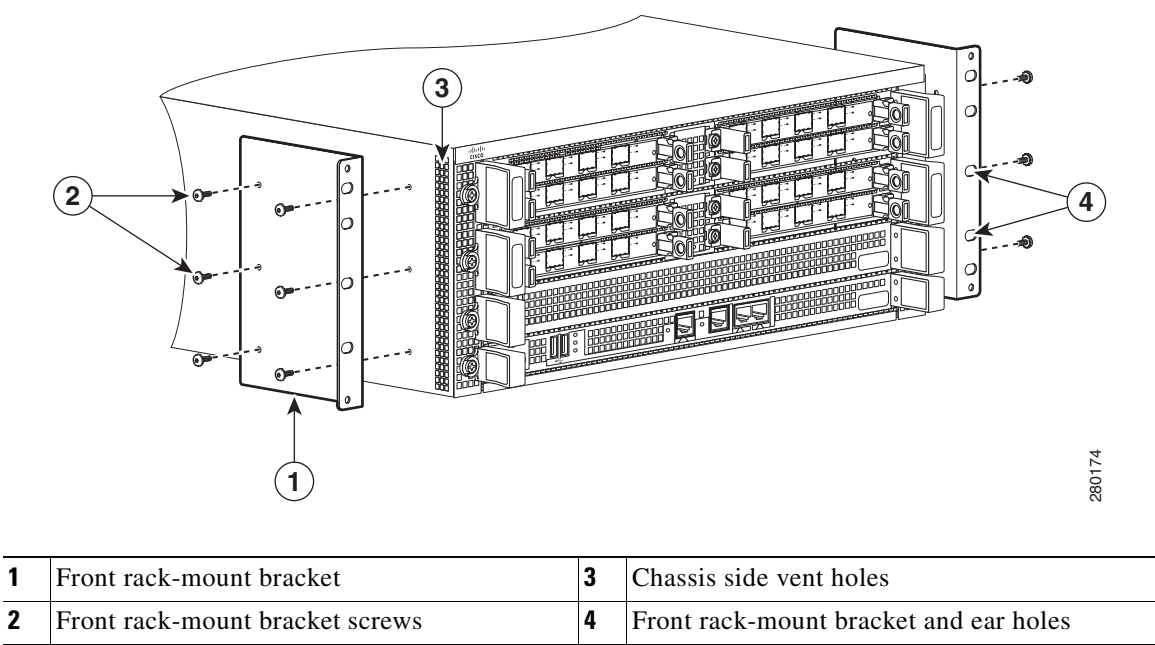
Chassis Front Rack-Mount Brackets

Determine where in the rack you want the chassis to be mounted. If you are mounting more than one chassis in the rack, then start from the bottom up or the center of the rack. Figure 5-7 shows the brackets attached to the chassis. Depending on the bracket holes you use, the chassis may protrude in the rack.

To install the front rack-mount brackets on a Cisco ASR 1004 Router, complete the following steps:

- Step 1
- Locate the threaded holes on the side of the chassis. Make certain that you hold the front rack-mount bracket with the ear and holes facing outward and towards the front of the chassis (see Figure 5-7). Figure 5-7 shows where to attach the front rack-mount brackets to the Cisco ASR 1004 Router.

Figure 5-7 Attaching the Front Rack-Mount Brackets to the Cisco ASR 1004 Router



- Step 2
- Position the front rack-mount bracket top hole with the chassis first top hole behind the side vent holes.
- Step 3
- Insert and tighten the black screws on one side.

- Step 4** Repeat Step 1 through Step 3 on the other side of the chassis. Use black screws to secure the rack-mount brackets to the chassis.
- Step 5** Install the chassis in a rack. To install the Cisco ASR 1004 Router in a rack, go to [Installing the Cisco ASR 1004 Router in a Rack](#), page 5-12.

This completes the steps for attaching the front rack-mount brackets to the Cisco ASR 1004 Router.

Chassis Rear Rack-Mount Brackets

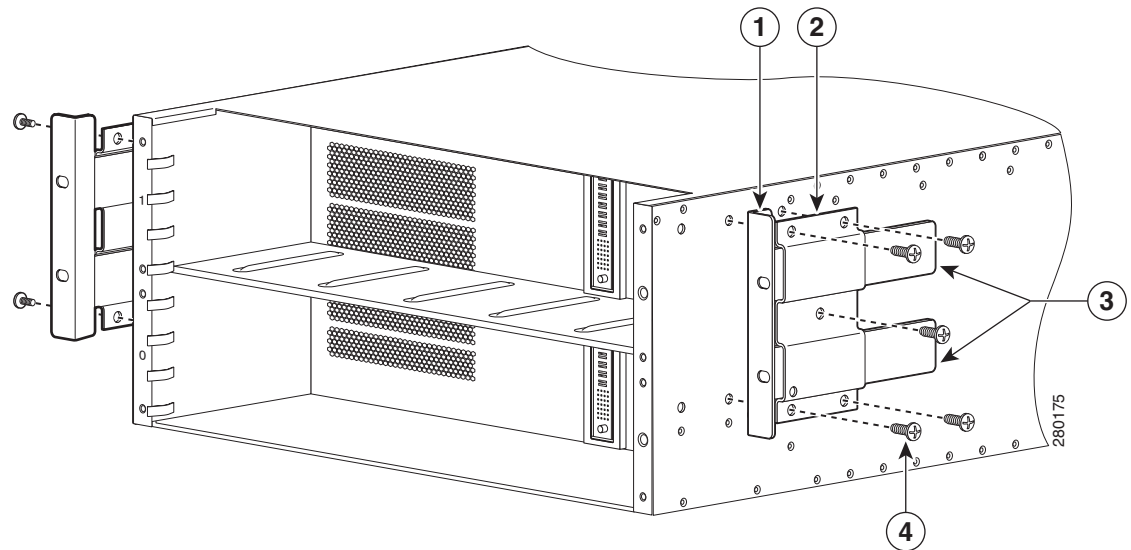
If you are rack mounting the chassis using the rear rack-mount brackets, then this type of installation provides for the chassis being recessed in the rack.

To install the front rack-mount brackets on a Cisco ASR 1004 Router, complete the following steps:

- Step 1** Locate the threaded holes on the rear side of the chassis. Make certain that you hold the rear rack-mount bracket with the ear and holes facing outward and towards the rear of the chassis (see [Figure 5-8](#)).

[Figure 5-8](#) shows where to attach the rear rack-mount brackets to the Cisco ASR 1004 Router.

Figure 5-8 Attaching the Rear Rack-Mount Brackets to the Cisco ASR 1004 Router



1	Rear rack-mount bracket ear and holes	3	Rear rack-mount bracket components that slide into rear bracket that is attached to the chassis
2	Rear rack-mount bracket (first bracket to attach to chassis)	4	Rear rack-mount bracket screws

- Step 2** Position the rear rack-mount bracket top hole with the chassis second top hole from the back (See [Figure 5-8](#)).
- Step 3** Insert and tighten the five screws on one side.

- Step 4** After the bracket is secured to the side of the chassis, slide the two remaining components into the side rack-mount bracket.
- Step 5** Repeat Step 1 through Step 3 on the other side of the chassis. Use five screws to secure the rear rack-mount brackets to the chassis.

This completes the steps for attaching the rear rack-mount brackets to the Cisco ASR 1004 Router.

**Caution**

Before you mount the ASR 1004 Router in a rack, make certain you read which rack-mount bracket ear holes to use when positioning the chassis in the rack. As a result of using the designated ear holes on the rack-mount bracket, the cable-management bracket installation will be made easier. For cable-management installation instructions, go to [Attaching a Chassis Ground Connection, page 5-16](#).

Installing the Cisco ASR 1004 Router in a Rack

After installing the rack-mount brackets on the chassis, you mount the chassis by securing the rack-mount brackets to two posts or mounting strips in the rack using the screws provided. Because the rack-mount brackets support the weight of the entire chassis, be sure to use all screws to fasten the two rack-mount brackets to the rack posts.

**Warning**

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
 - When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
 - If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006
-

We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

To install the chassis in the rack, complete the following steps:

- Step 1** On the chassis, ensure that all screw fasteners on the installed components are securely tightened.
- Step 2** Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized. See the next sections on the types of racks you can use to install the chassis.
- Step 3** (Optional) Install a shelf in the rack to support the Cisco ASR 1004 Router. If you use a shelf, this will help support the chassis while you secure it to the rack.
- Step 4** With two people, lift the chassis into position between the rack posts.
- Step 5** Align the mounting bracket holes with the rack post holes and attach the chassis to the rack.

**Note**

If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis.

Step 6 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

Step 7 Hold the chassis in position against the mounting rails and follow these steps:

- a. The Cisco ASR 1004 rack-mount ears contain 8 ear holes. Insert the bottom screw into the third hole up from the bottom of the rack mount ear and use a hand-held screwdriver to tighten the screw to the rack rail.



Note In the next step, insert the top screw diagonally from the bottom screw that you just attached. This helps with keeping the chassis in place.

- b. Insert the top screw into the third hole down from the top of the rack mount ear and tighten the screw to the rack rail.
- c. Insert a screw in the middle of the rack-mount bracket on both sides of the chassis.
- d. Repeat these steps for the other side of the chassis.



Note As a result of using the specified rack-mount bracket ear holes, the cable-management bracket can be easily attached to the rack-mount bracket when the chassis is in the rack.

Step 8 Tighten all screws on each side to secure the chassis to the equipment rack.

You can install your Cisco ASR1004 chassis in a two-post rack or a four-post rack. See the [“Two-Post Rack Installation” section on page 5-13](#) and the four-post rack installation, go to the [“Four-Post Rack Installation” section on page 5-14](#).

Two-Post Rack Installation

The Cisco ASR 1004 Router can be installed in a two-post rack, either 19 inch or 23 inch.



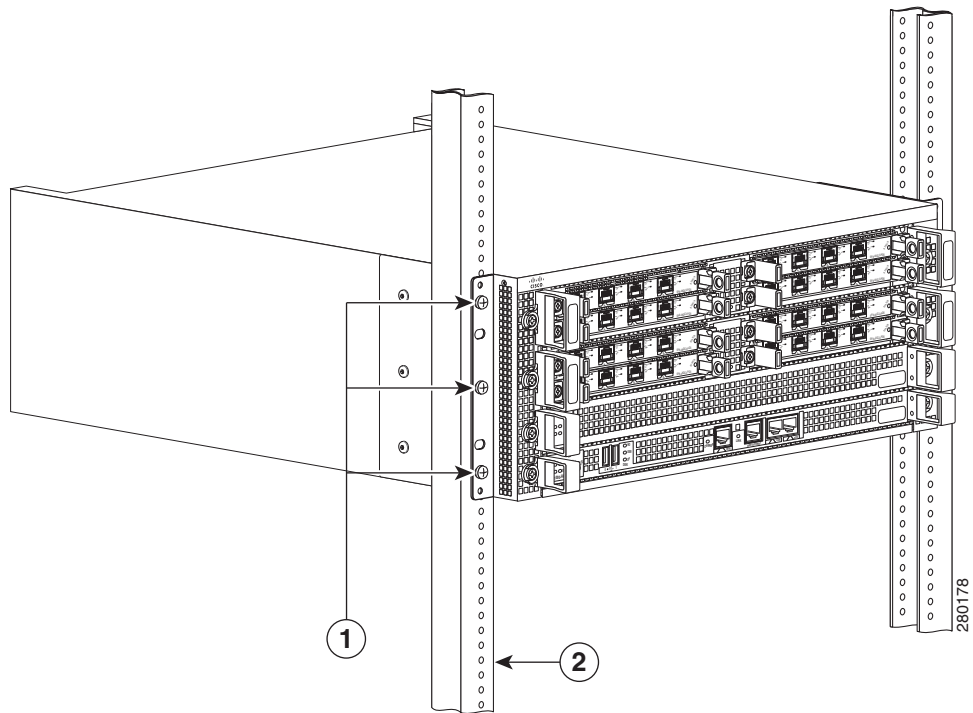
Note Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26cm). The height of the chassis is 6.95 inches (17.653 cm). Airflow through the chassis is from front to back.



Caution If you are using a two-post rack secure the rack to the floor surface to prevent tipping and avoid bodily injury and component damage.

Step 1 Position the chassis so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.

[Figure 5-9](#) shows where to attach the chassis rack-mount brackets to the equipment rack.

Figure 5-9 Attaching the Rear Rack-Mount Brackets to the Cisco ASR 1004 Router

1	Rack-mount bracket ear and holes	2	Rack equipment rail
----------	----------------------------------	----------	---------------------

- Step 2** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 3** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 4** For each bracket, insert and tighten two screws to the rack on both sides.

This completes the procedure for installing the chassis in a two-post rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 5-16 to continue the installation.

Four-Post Rack Installation

The Cisco ASR 1004 Router can be flush-mounted in a 19-inch equipment rack using the rack-mounting kit provided with your system. The Cisco ASR 1004 Router can be mounted into the rack using two recommended methods:

- Installing the chassis in an existing rack with equipment.
- Installing an empty chassis in a rack with no equipment installed.

When handling the chassis, always follow proper lifting practices, see [Chassis-Lifting Guidelines](#), page 3-20.

**Note**

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26cm). The height of the chassis is 6.95 inches (17.653 cm). Airflow through the chassis is from front to back.

**Note**

Make sure the rack is stabilized.

Step 1 (Optional) Install a shelf in the rack to support the Cisco ASR 1004 Router. If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis. Using two people, lift the chassis into the rack using the side handles and grasping underneath the power supply bays.

Step 2 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

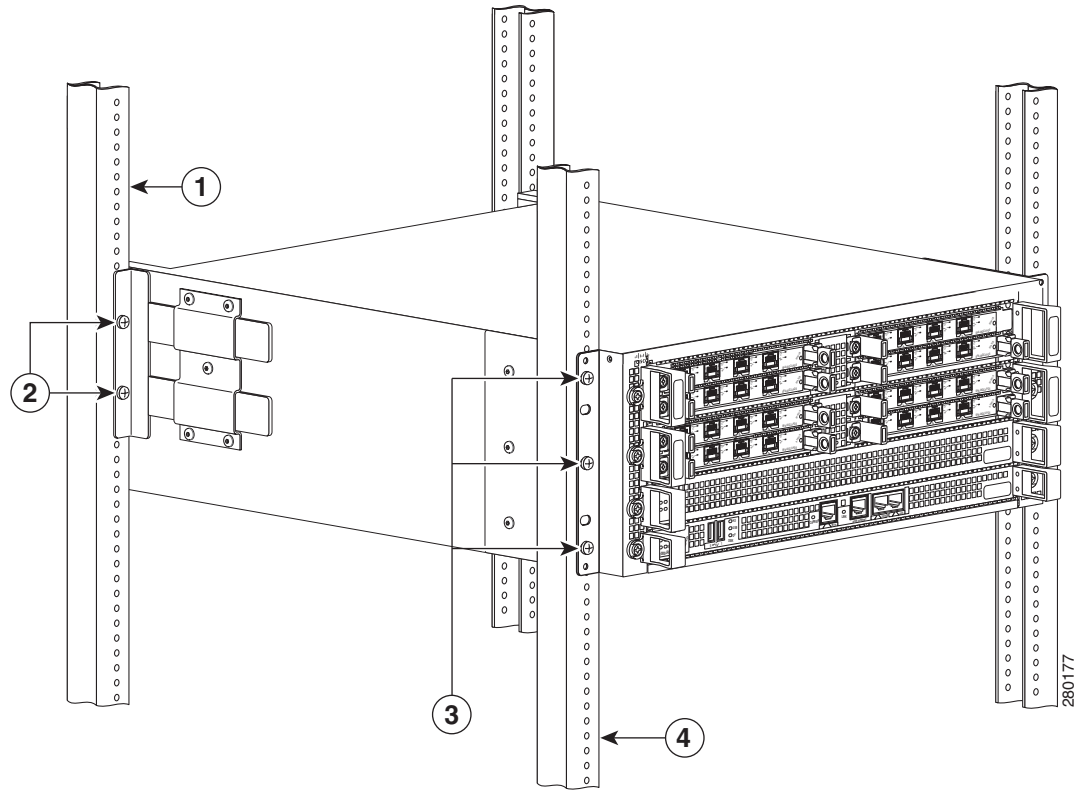
**Note**

Use the third hole up from the bottom of the rack-mount bracket and the third hole down from the top of the rack-mount bracket.

Step 3 Hold the chassis in position against the mounting rails while the second person finger-tightens a screw to the rack rails on each side of the chassis. [Figure 5-10](#) shows the rear rack-mount brackets and the front rack-mount brackets on the Cisco ASR 1004 Router.

Step 4 Finger-tighten 4 more screws to the rack rails on each side of the chassis.

Step 5 Tighten all screws on each side to secure the chassis to the equipment rack.

Figure 5-10 Cisco ASR 1004 Router in a Four Post Rack - Front and Rear Rack-Mounting

1	Equipment rack rear rail	3	Front rack-mount bracket ear and holes
2	Chassis rear rack-mount bracket and ear holes	4	Equipment rack front rail

Step 6 Use a level to verify that the tops of the two brackets are level, or use a measuring tape to verify that both brackets are the same distance from the top of the rack rails.

This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 5-16 to continue the installation.

Attaching a Chassis Ground Connection

Connecting the Cisco ASR 1004 Router chassis to earth ground is required for all DC powered installations and any AC powered installation where compliance with Telcordia grounding requirements is necessary.



Caution

The dual-lug chassis ground stud must be installed, the SIP and SPA must be fully inserted and screwed in and earthed to prevent a potential hazard in a telecom line.

Have the recommended tools and supplies available before you begin this procedure.

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Before you connect power or turn on power to your chassis, you must provide an adequate chassis ground (earth) connection for the chassis. A chassis ground connector is provided on each Cisco ASR 1004 Router. (See [Figure 5-11 on page 5-17](#).) There is a grounding stud on the side of the chassis and on the DC power supply (primary grounding stud).

**Caution**

The grounding wire is always the first to be installed or connected and the last to be removed or disconnected.

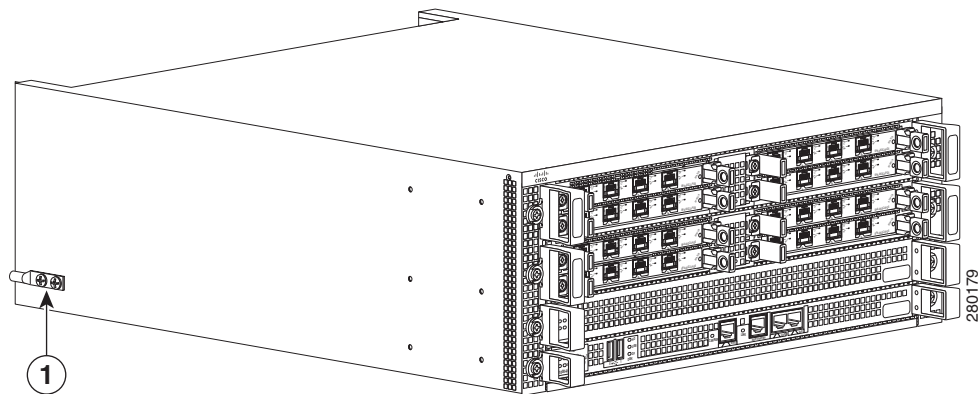
Recommended Tools and Supplies

The following tools, equipment, and supplies necessary to connect the system ground to the chassis:

- Phillips screwdriver
- Dual-lug chassis ground component
- Grounding wire

[Figure 5-11](#) shows the location of the dual ground lug on the rear of the of Cisco ASR 1004 Router.

Figure 5-11 Chassis Ground Lug Location on the Cisco ASR 1004 Router



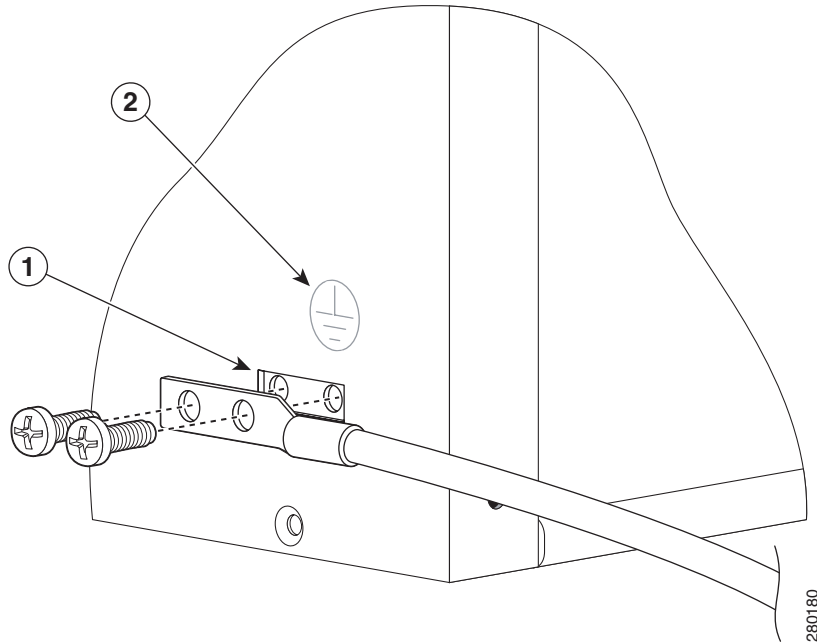
- | | |
|----------|---|
| 1 | Chassis ground connector on the Cisco ASR 1004 Router |
|----------|---|

Use the following procedure to attach the grounding lug to the chassis ground connector on your chassis:

- | | |
|---------------|---|
| Step 1 | Use the wire stripper to strip one end of the AWG #6 wire approximately 0.75 inches (19.05 mm). |
| Step 2 | Insert the AWG #6 wire into the wire receptacle on the grounding lug. |
| Step 3 | Use the crimping tool to carefully crimp the wire receptacle around the wire; this step is required to ensure a proper mechanical connection. |

- Step 4** Attach the grounding lug with the wire on the left to avoid having the grounding wire overlapping the power supply. [Figure 5-12](#) shows how to attach the grounding screws.

Figure 5-12 Attaching a Grounding Lug to the Chassis Ground Connector



1	Chassis ground connector	2	Ground symbol
----------	--------------------------	----------	---------------

- Step 5** Locate the chassis ground connector on the side of your chassis.
- Step 6** Insert the two screws through the holes in the grounding lug as shown in [Figure 5-12](#).
- Step 7** Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not overtighten the screws.
- Step 8** Connect the opposite end of the grounding wire to the appropriate grounding point at your site to ensure an adequate chassis ground.

This completes the procedure for attaching a chassis ground connection. To continue on, go to [Attaching the Cable-Management Bracket, page 5-19](#).

Attaching the Cable-Management Bracket

The cable-management brackets mount to each rack-mount bracket on the chassis to provide cable-management to both sides of the chassis (parallel with card orientation). These brackets are screw mounted to the rack-mount brackets to allow easy installation and removal of cables.

The cable-management brackets for the Cisco ASR 1004 Router contain three independent cable-management “U” type features with four screws and provides cable dressing of each card module slots. For Cisco ASR 1000 SIPs, these brackets work in tandem with shared port adapter product feature cable-management device to allow installation and removal of adjacent cards without the need to remove cables.

**Note**

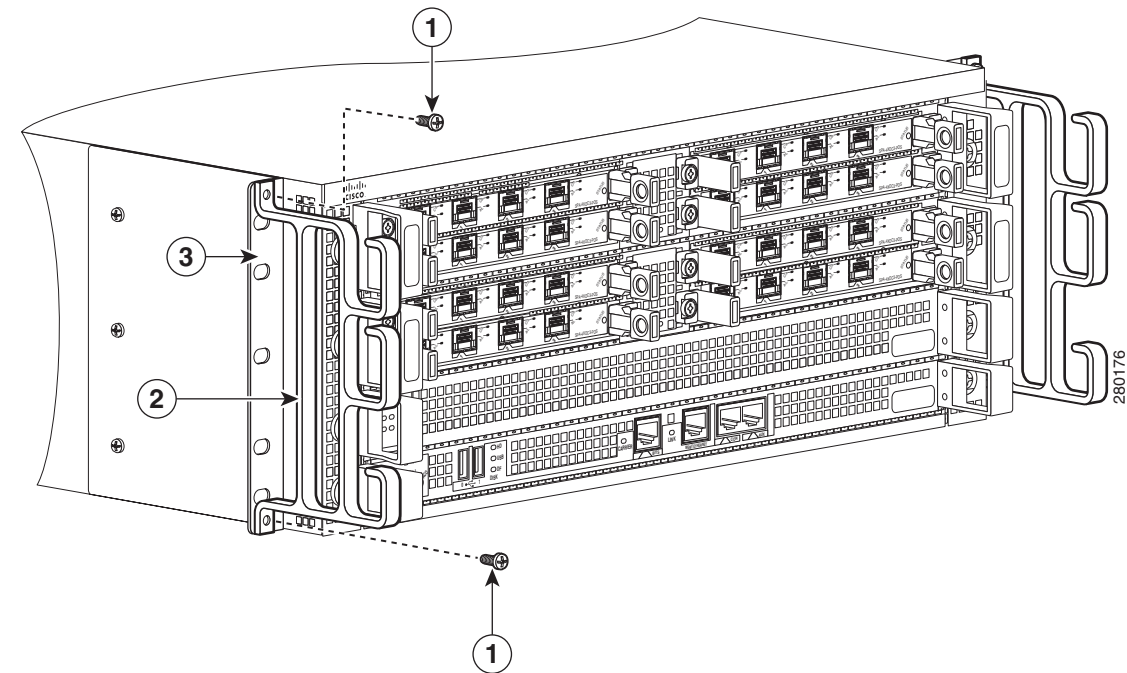
Make certain that the cable-management bracket “U” type feature is facing upwards when you attach it to the chassis.

Follow these steps to attach the cable-management brackets to both sides of the Cisco ASR 1004 Router in the equipment rack:

-
- Step 1** Align the cable-management bracket to the rack-mount bracket on one side of the Cisco ASR 1004 Router. The cable-management bracket aligns to the top hole of the chassis rack-mount bracket.
- Step 2** Using a Phillips screwdriver, insert the screw through cable-management bracket and into the chassis rack-mount and tighten the screw.

[Figure 5-13](#) shows where to attach the cable-management brackets to the Cisco ASR 1004 Router in a rack.

Figure 5-13 Chassis Rack-Mount Bracket Ear Holes for the Cable-Management Bracket



1	Cable-management bracket top and bottom screw	3	Chassis rack-mount bracket
2	Cable-management bracket and U feature device		

Step 3 Using the bottom rack-mount ear hole, insert the screw through cable-management bracket and into the chassis rack-mount (see Figure 5-13).

This completes the procedure for installing the cable-management brackets on the chassis in a rack.

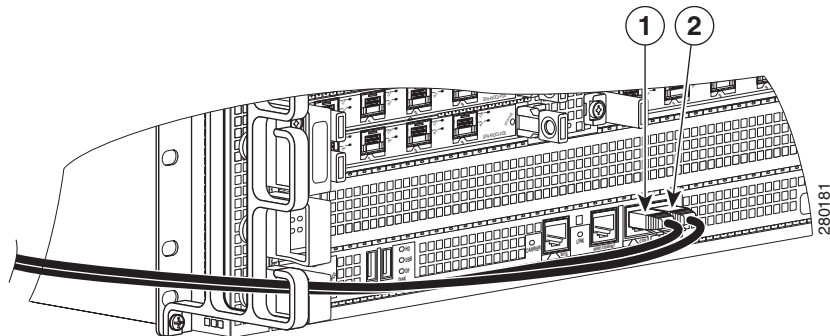
Connecting Shared Port Adapter Cables

The instructions for connecting the cables for the shared port adapter installed in the Cisco ASR 1004 Router are contained in the respective configuration documents for each port adapter. For example, if you are connecting the optical fiber cables for the PA-POS-OC3 port adapter, refer to the configuration note *PA-POS-OC3 Packet OC-3 Port Adapter Installation and Configuration Guide* at <http://www.cisco.com/univercd/cc/td/doc/product/core>

Connecting Console and Auxiliary Port Cables

The Cisco ASR 1004 Router has a DCE-mode console port for connecting a console terminal and a DTE-mode auxiliary port for connecting a modem or other DCE device (such as another router) to your chassis. [Figure 5-14](#) shows the CON and AUX ports on the Cisco ASR 1000 Series RP1 route processor card.

Figure 5-14 Cisco ASR 1000 Series RP1—CON and AUX Ports



1	Console port - CON	2	Auxiliary port - AUX
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Note

Both the console and the auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco ASR 1004 Router uses RJ-45 ports for both the auxiliary port and the console port.

For console and auxiliary port pinouts for the RJ-45 connector, see [Cisco ASR 1004 Router Specifications, page A-5](#). Both ports are configured as asynchronous serial ports.

- | | |
|---------------|---|
| Step 1 | Before connecting a terminal to the console port, configure the terminal to match the chassis console port as follows: 9600 baud, 8 data bits, no parity, 1 stop bits (9600 8N1). |
| Step 2 | After you establish normal router operation, you can disconnect the terminal. |

Connecting the Ethernet Management Port Cable

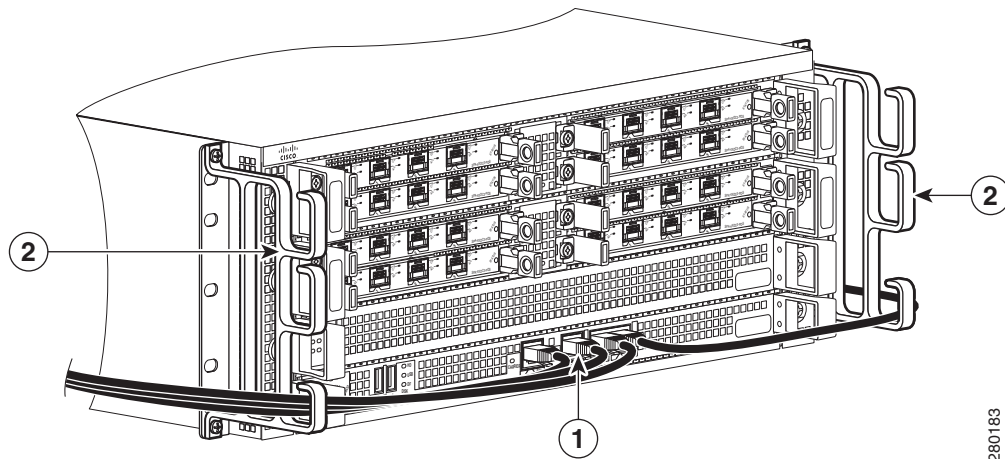
When using the Fast Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Fast Ethernet Management port is configured to a fixed speed (10/100/1000 Mbps) through command-line interface (CLI) commands, the port is forced to MDI mode.

When in a fixed-speed configuration and MDI mode:


- Use a crossover cable to connect to an MDI port
- Use a straight-through cable to connect to an MDI-X port

Figure 5-15 Cisco ASR 1000 Series RP1 MGMT Ethernet Port Connector




1	MGMT Ethernet port	2	Cable-management bracket and U feature device
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Connecting Power to Cisco ASR 1004 Router




Warning

The covers are an integral part of the safety design of the product. Do not operate the unit without the covers installed. Statement 1077




Warning

When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

This section provides the procedures for connecting AC-input and DC-input power to your Cisco ASR 1004 Router.

The DC power supply for the Cisco ASR 1006, ASR 1004, and ASR 1002 routers operate at individual specifications. [Table 5-2](#) shows the common input ranges and circuit breaker requirements.

Table 5-2 Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps		AWG # Wire	
		Minimum	Maximum	Minimum	Maximum
Cisco ASR 1006	40	Always 50		Always AWG #6 wire	
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20Amp circuit breaker and an AWG #10 gauge wire for a 30Amp circuit breaker.



Note

All Cisco ASR 1000 Series Router AC power supplies require a 20 AMP circuit breaker.



Note

Detailed instructions for removing and replacing the Cisco ASR1000 Series AC and DC power supplies are in [Chapter 8, “Replacing Cisco ASR 1000 Series Routers Field-Replaceable Units.”](#)

Connecting AC-Input Power to Cisco ASR 1004 Router

Follow these steps to connect an AC-input power supply to the Cisco 1004 chassis:

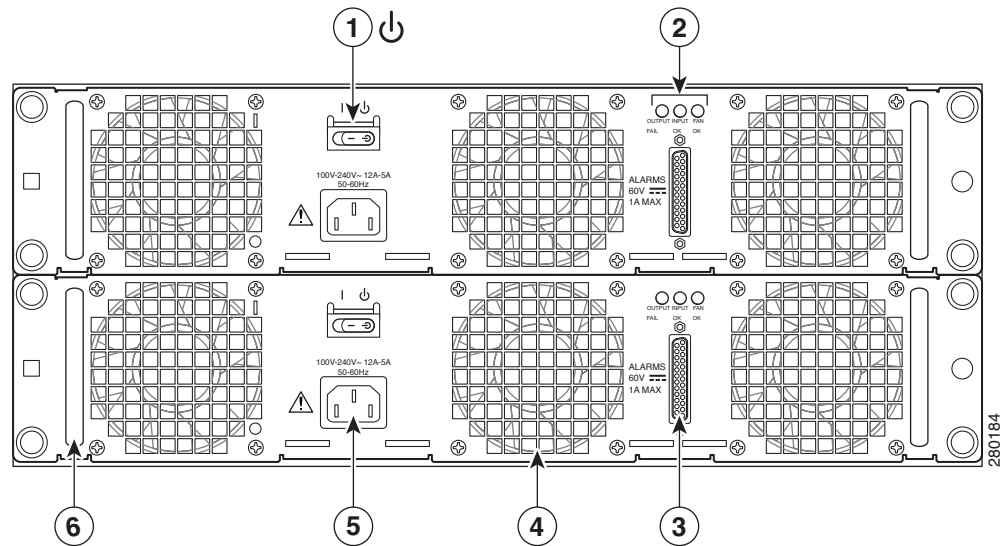
- Step 1** Insert an AC power supply in power supply slot 0 or power supply slot 1 until it is fully seated.
- Step 2** Tighten the captive screws.
- Step 3** Insert the AC power cable into the power inlet.
- Step 4** Plug the power supply cable into the power source.



Note

For additional AC power cable strain relief, secure the cable to the power supply handle by inserting a nylon cable tie through the hole in the handle and around the cable.

Figure 5-16 Cisco ASR 1004 Router AC Power Supply



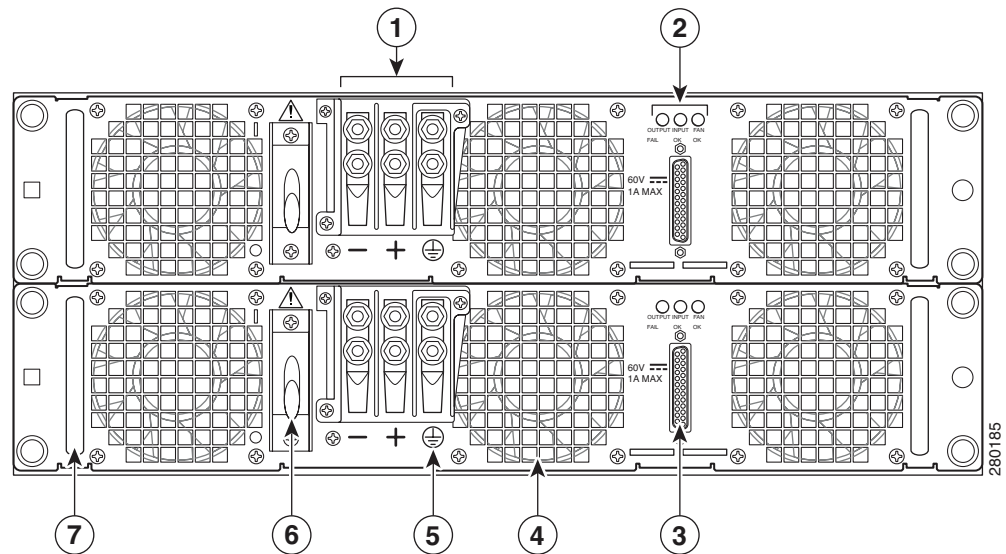
1	AC power supply Standby switch	4	AC power supply fan
2	AC power supply LEDs	5	AC power inlet
3	DB-25 alarm connector	6	AC power supply handle

Step 5 Turn the power supply switch to On (I) position.

This completes the procedure for connecting AC-input power.

Connecting DC-Input Power to Cisco ASR 1004 Router

This section describes how to connect the DC power supply in the Cisco ASR 1004 Router.

Figure 5-17 Cisco ASR 1004 Router DC Power Supply

1	DC power supply terminal block and plastic cover	5	DC power supply earth ground symbol
2	DC power supply LEDs	6	DC power supply On (I)/ Off (O)
3	DB-25 alarm connector	7	DC power supply handle
4	DC power supply fan		

Before you begin, read these important notices:

- The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground (GND), black is used for -48V on negative (-) terminal and red is used for RTN on the positive (+) terminal. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.
- For DC input power cables, select the appropriate wire gauge based on the National Electrical Code (NEC) and local codes for 60-amp service at nominal DC input voltage (-48/-60 VDC). Three pairs of cable leads, source DC (-) and source DC return (+), are required for each power distribution unit (PDU). These cables are available from any commercial cable vendor. All input power cables for the chassis should have the same wire gauge and cable lengths should match within 10 percent of deviation.

Each DC input power cable is terminated at the PDU by a cable lug. The cable lugs must be dual-hole, and have a 45-degree angle tongue. They must be able to fit over #10 power terminal stud.



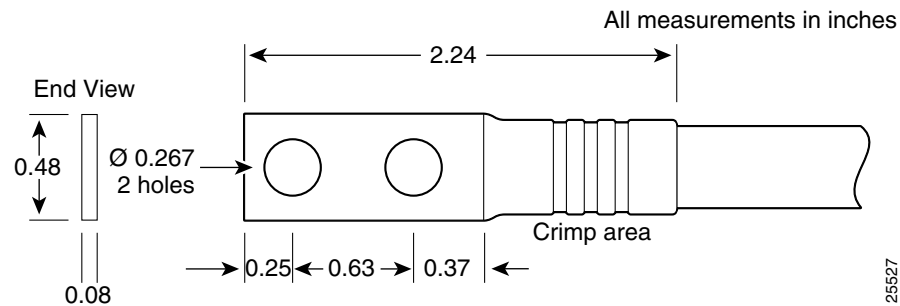
Note DC input power cables must be connected to the PDU terminal studs in the proper positive (+) and negative (-) polarity. In some cases, the DC cable leads are labeled, which is a relatively safe indication of the polarity. However, you must verify the polarity by measuring the voltage between the DC cable leads. When making the measurement, the positive (+) lead and the negative (-) lead must always match the (+) and (-) labels on the PDU.

- An earth ground cable is required for each DC PDU. We recommend that you use at least 6-AWG multistrand copper wire. This wire is not available from Cisco Systems; it is available from any commercial cable vendor.

The ground wire cable lug should be dual-hole (as shown in Figure 5-18) and able to fit over M6 terminal studs at 0.625-inch (15.88-mm) centers. Recommended lug terminal wire size Panduit part number:

- LCD8-14A-L for 8AWG wire size
- LCD6-14A-L for 6AWG wire size

Figure 5-18 DC Input Power Cable Lug



Note

To avoid hazardous conditions, all components in the area where DC input power is accessible must be properly insulated. Therefore, before installing the DC cable lugs, be sure to insulate the lugs according to the manufacturer's instructions.



Warning

When you install the unit, the ground connection must always be made first and disconnected last.
Statement 1046



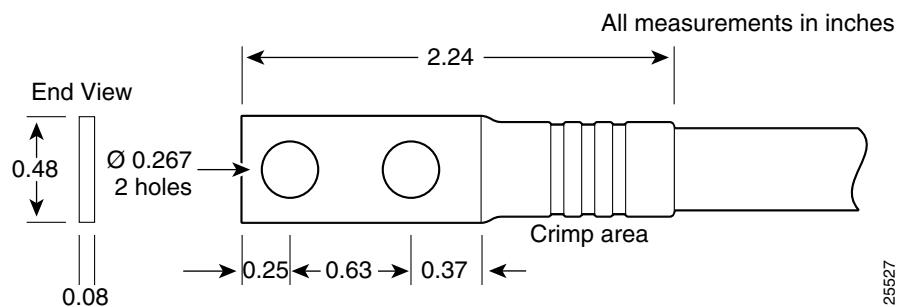
Warning

When you install the unit, the ground connection must always be made first and disconnected last.
Statement 1046**To connect the Cisco ASR 1004 Router DC power supply, follow these steps:**

- Step 1** Make certain that the chassis grounding is connected before you begin installing the DC power supply.
- Step 2** Locate the terminal block and remove the plastic cover.
 - a. Unscrew and remove the two screws.
 - b. Slide the plastic cover off of the terminal block.

- Step 3** On the DC power supply terminal block, locate the **GND** connection which must be connected first and follow these steps:
- Using the two-hole grounding lug, replace the washers and Kepnut screw in the following order.
 - Flat washer
 - Grounding cable lug
 - Kepnut screw
 - Tighten the Kepnut screws (use the screwdriver to tighten the screw in the terminal block to a torque of 8 in-lbs / 2 per.) on the power supply studs.

Figure 5-19 Cisco ASR 1004 Router DC Power Supply Grounding Wire and Stud



- Step 4** Attach the other end of the cable to the site ground connection.

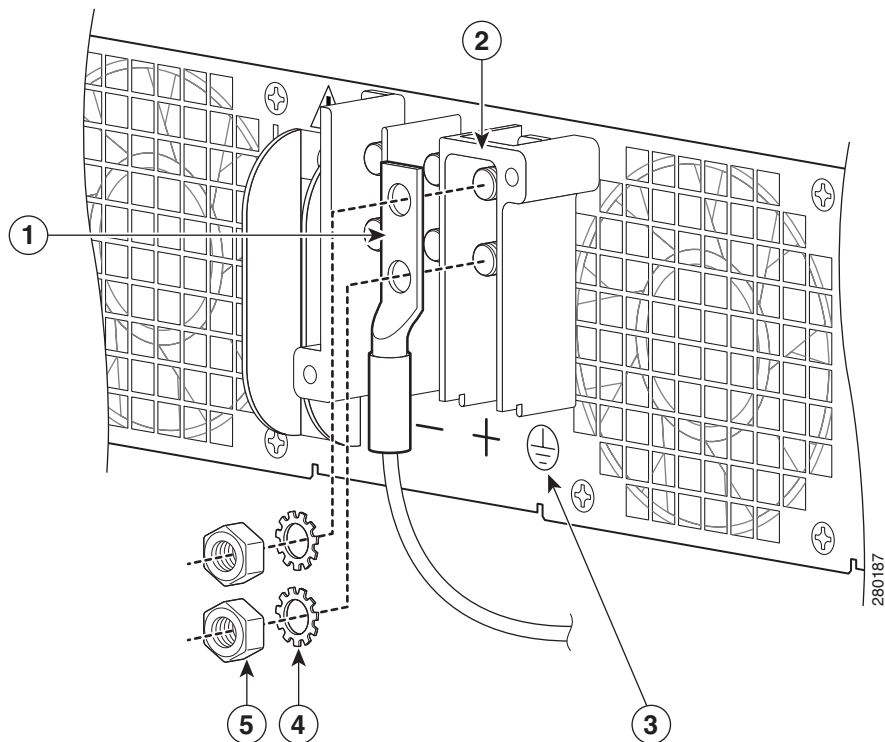


Caution

Before you continue to install the terminal block wires, stop and perform Step 5. To prevent any contact with metal lead on the wire and the plastic cover.

- Step 5** You must wrap the positive and negative cables with sleeving. Take each wire and cover the area from the lug to the wire with heavy shrink sleeving.

Figure 5-20 Cisco ASR 1004 Router DC Power Supply Cable Connection



1	Power supply stud and wire	4	Flat washer
2	Ground lug nut	5	Kepnut screw
3	Earth ground symbol		

- Step 6** For easier cable-management, insert the negative cable first. Replace the ground lug with cable in the following order:
- a. Flat Washer
 - b. Ground lug with negative wire
 - c. Kepnut screw

- Step 7** Tighten the Kepnut screw (use the screwdriver to tighten the screw in the terminal block to a torque of 8 in-lbs / 4 per.) and repeat the same steps for the positive stud and wire.



Note Secure the wires coming in from the terminal block so that they cannot be disturbed by casual contact.

- Step 8** Use tie wraps to secure the wires, so that the wires are not pulled from the terminal block by casual contact. Ti-wrap studs are located below the supply terminal block.
- Step 9** Replace the terminal block plastic cover, which slides over the terminal block; then tighten the screws (tighten the screw to a torque of 5 in-lbs / 1 per.).
- Step 10** Remove the tape from the circuit-breaker switch handle and move the circuit-breaker handle to the on position, if you taped the circuit breaker.

Step 11 Switch the On/Off circuit breaker switch to the On (I) position.

This completes the procedure for connecting the DC power supply in the Cisco ASR 1004 Router.

Connecting a Terminal to the Cisco ASR Series 1000 RP1 Console Port

The Cisco ASR 1004 router processor has an asynchronous serial (EIA/TIA-232) RJ-45 console port labeled CON on its front panel. You can connect this port to most types of video terminals through use of the console cable kit that is included with your Cisco ASR 1004 Router. The console cable kit contains:

- One RJ-45 to RJ-45 crossover cable
- One RJ-45 to DB-25 (female) adapter
- One RJ-45 to DB-9 (female) adapter

A crossover cable reverses pin connections from one end to the other. In other words, it connects pin 1 (at one end) to pin 8 (at the other end), pin 2 to pin 7, pin 3 to pin 6, and so on. You can identify a crossover cable by comparing the two modular ends of the cable. Hold the cable ends in your hand, side-by-side, with the tabs at the back. Ensure that the wire connected to the outside (left) pin of the left plug (pin 1) is the same color as the wire connected to the outside (right) pin of the right plug (pin 8).

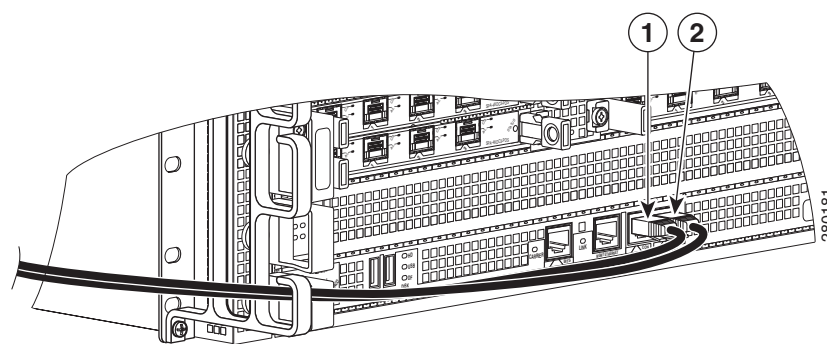
Use the following procedure to connect a video terminal to the console port on a route processor.



Note

Each Cisco ASR 1000 Series Route Processor 1 must have a console port connection (typically to a terminal server) if you are running a redundant configuration in the chassis.

Figure 5-21 Cisco ASR 1004 Router ASR 1000 Series RP1 Console Port

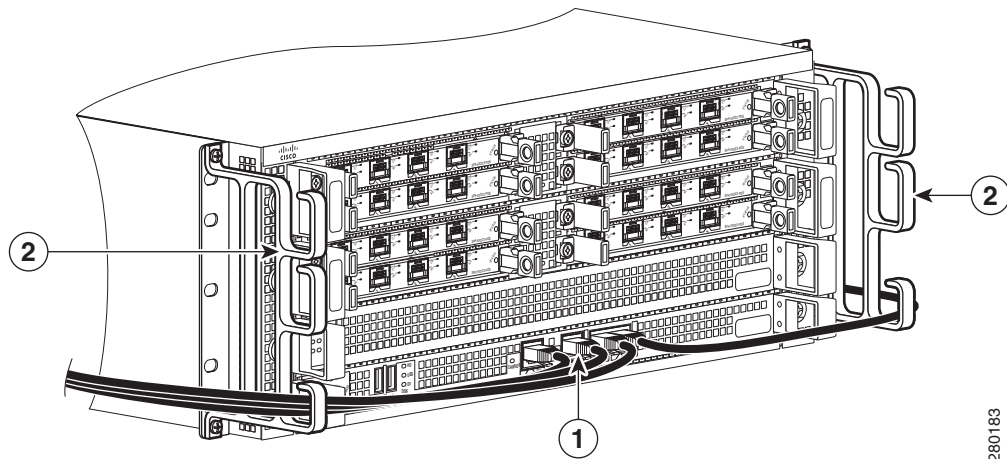


1	CON port connection	2	AUX port connection
----------	---------------------	----------	---------------------

Step 1 Connect one end of the RJ-45 cables to the serial RJ-45 port (CON) on the Cisco ASR 1000 Series Route Processor 1 (Figure 5-21).

- Step 2** Run the cable up and through the cable-management bracket and connect the other end of the RJ-45 cable to the RJ-45 adapter (Figure 5-22).

Figure 5-22 Cisco ASR 1004 Router Cable-Management Bracket



1	BITS port connection	2	Cable-management bracket U feature device
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- Step 3** Connect the adapter to your video terminal to complete the cable connection.
- Step 4** Power on your video terminal.
- Step 5** Configure your video terminal to match the following default console port settings:
- 9600 baud
 - 8 data bits
 - No parity generation or checking
 - 1 stop bit
 - No flow control
- Step 6** Go to the “[Connecting Network Management and Signal System Cables](#)” section on page 5-30 to continue the installation.

Connecting Network Management and Signal System Cables

The Cisco ASR 1004 Router has connections to both the internal Ethernet management network and the external data network.

- The internal Ethernet management network connections are made through an Ethernet port on the front panel of the Cisco ASR 1000 Series Route Processor 1.
 - The external data network connections are made through front panel ports on several types of SPAs.
- Keep the following guidelines in mind when connecting external cables to the Cisco ASR 1004 Router:
- To reduce the chance of interference, avoid crossing high-power lines with any interface cables.

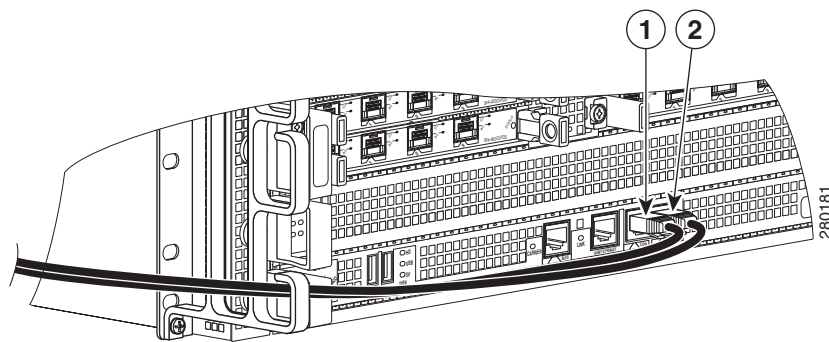
- Verify all cabling limitations (particularly distance) before powering on the system.

Auxiliary Connection

This asynchronous EIA/TIA-232 serial port (AUX) is used to connect a modem to the Cisco ASR 1000 Series Route Processor 1 for remote administrative access. Use the following procedure to connect the Cisco ASR 1004 Router to a modem.

- Step 1** Connect one end of the modem cable to the RJ-45 port on the primary Cisco ASR 1000 Series Route Processor 1, labeled AUX.

Figure 5-23 Cisco ASR 1000 Series RP1 Auxiliary Connector



1	CON port connection	2	AUX port connection
----------	---------------------	----------	---------------------

- Step 2** Run the cable up and through the cable-management bracket and connect the other end of the cable to your modem.

If you have completed all cable connections, go to, [Chapter 7, “Cisco ASR 1000 Series Routers Power Up and Initial Configuration.”](#)



CHAPTER 6

Cisco ASR 1002 Router Overview and Installation

This chapter describes the Cisco ASR 1002 Router and provides procedures for installing the Cisco ASR 1002 Router on an equipment shelf or tabletop or in an equipment rack.

This chapter contains the following sections:

- [Cisco ASR 1002 Router Description, page 6-1](#)
- [General Rack Installation Guidelines, page 6-10](#)
- [Guidelines for an Equipment Shelf or Tabletop Installation, page 6-11](#)
- [Equipment Shelf or Tabletop Installation, page 6-12](#)
- [Rack-Mounting a Cisco ASR 1002 Router, page 6-13](#)
- [Two-Post Rack Installation, page 6-18](#)
- [Attaching a Chassis Ground Connection, page 6-23](#)
- [Connecting Power to Cisco ASR 1002 Router, page 6-27](#)

Cisco ASR 1002 Router Description

The Cisco ASR 1002 Router is part of the Cisco aggregation services family of routers. The Cisco ASR 1002 Router offers a compact form factor router that satisfies customer demands such as low power consumption and decreased usage of rack space.

The Cisco ASR 1002 Router supports three half-height SPAs and an optional built-in 4xGE SPA. The Cisco ASR 1002 Router supports all the general-purpose routing and security features of the Cisco ASR 1000 Series Routers. It uses the same internal control and data-plane architecture as the other Cisco ASR 1000 Series Routers.

The Cisco ASR 1002 Router supports:

- Cisco ASR1000-ESP5 or Cisco ASR1000-ESP10 as a field-replaceable unit (FRU)
- The Cisco Embedded Route Processor which supports 2MB upgradeable BootROM and 8GB eUSB bulk storage.
- 1 + 1 redundant AC or DC power supplies.
- Stratum-3 network clocking per GR-1244-CORE, with T1/E1 BITS interface or SPAs as timing sources.

- A built-in 4x1GE Interface providing four SFP based GE connections, designated as SPA bay 0.



Note

The built-in Gigabit Ethernet ports on the Cisco ASR1002 Router support the same small form-factor pluggable (SFP) optical transceivers as the 5x1 GE SPA. For specific shared port adapter SFP compatibility listings, go to Chapter 1 in: http://cisco.com/en/US/docs/interfaces_modules/shared_port_adapters/install_upgrade/ASR1000/ASRspahw.pdf
(This does not include the Ethernet management port on the Cisco ASR1000-RP1.)

The Cisco ASR 1002 Router supports upgradeable Cisco ASR1000-ESP5 or ASR1000-ESP10 assembly and the power supply modules as field-replaceable units. The Cisco embedded ASR1000-SIP10 and Cisco embedded ASR1000-RP1 assemblies are fixed into the chassis and are not upgradeable; but the shared port adapters in the SIP are field upgradeable.

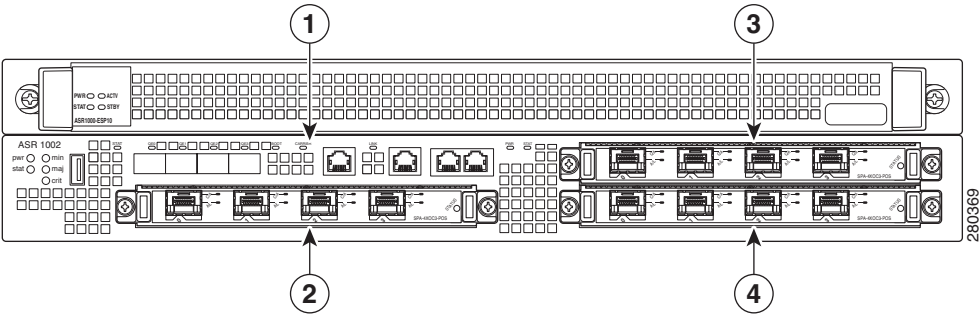
This section contains the following topics:

- [Front View, page 6-2](#)
- [Rear View, page 6-3](#)
- [Cisco ASR 1002 Router Components, page 6-4](#)

Front View

Figure 6-1 shows the Cisco ASR 1002 Router with modules installed.

Figure 6-1 Cisco ASR 1002 Router –Front View



1	Embedded ASR1000-RP1 in the subslot and represents the built in 4xGE SPA.	3	SPA subslot 1
2	SPA subslot 2	4	SPA subslot 3



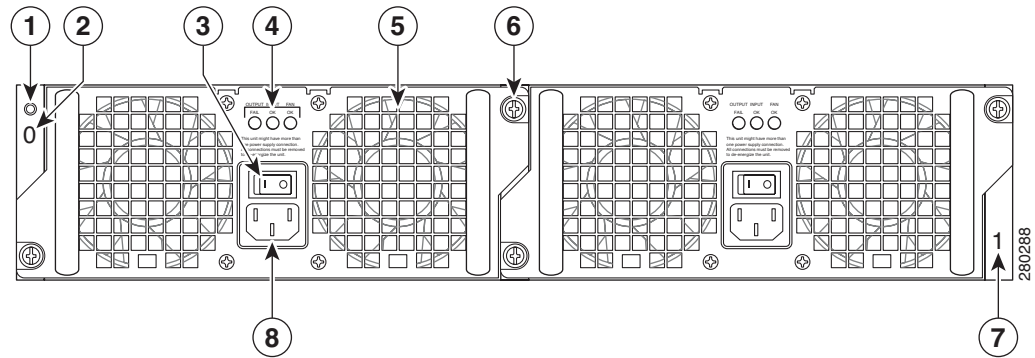
Note

The SPAs in subslots 1-3 are field upgradeable. The SIP that the SPAs reside in is not field-upgradeable and the Cisco ASR1000-RP1 is embedded in the chassis and not field upgradeable.

Rear View

Figure 6-2 shows the Cisco ASR 1002 Router AC power supply.

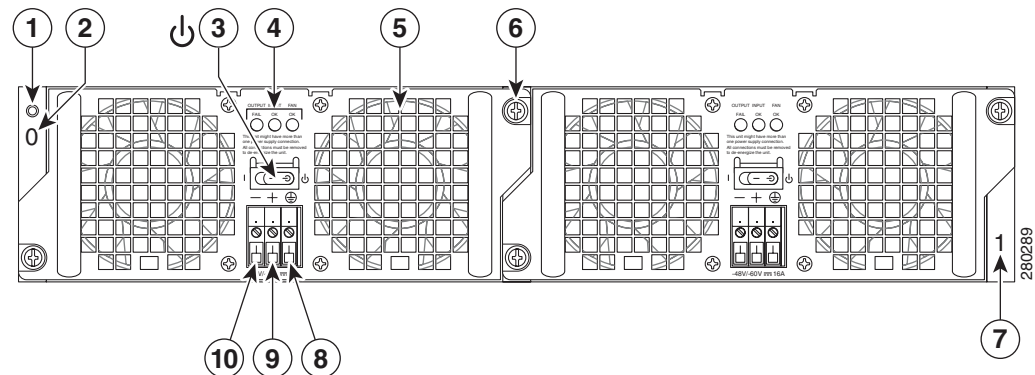
Figure 6-2 Cisco ASR 1002 Router AC Power Supply



1	Chassis ESD socket	5	AC power supply fan
2	AC power supply slot number 0	6	AC power supply captive installation screw
3	AC power supply On (I) /Off (O) switch	7	AC power supply slot number 1
4	AC power supply LEDs	8	AC power inlet

Figure 6-3 shows the Cisco ASR 1002 Router with a DC power supply.

Figure 6-3 Cisco ASR 1002 Router DC Power Supply



1	Chassis ESD socket	6	DC power supply captive installation screw
2	DC power supply slot 0 label	7	DC power supply slot 1 label
3	DC power supply switch Standby/On (I) (standby symbol is a broken circle with a vertical line through the top of it)	8	Earth ground lead
4	DC power supply LEDs	9	Positive lead
5	Power supply fan	10	Negative lead

Internal fans draw cooling air into the chassis and across internal components to maintain an acceptable operating temperature. The fans are located at the rear of the chassis. A two-hole grounding lug is located on the side of the chassis. Two power supplies, either two AC power supplies or two DC power supplies are accessed from the rear of the router.

**Caution**

Use only AC power supplies or DC power supplies in the Cisco ASR 1002 Router. Do not mix power supply types.

Cisco ASR 1002 Router Components

The Cisco ASR 1002 Router system is derived from the architecture of the other Cisco ASR 1000 Series routers. The three main subassemblies of any Cisco ASR 1000 Series Routers are all supported in the Cisco ASR 1002 Router, which is the:

- Cisco embedded ASR1000-RP1 and Cisco embedded ASR1000-SIP10 (not field upgradable)
- Cisco ASR1000-ESP5 and Cisco ASR1000-ESP10 embedded services processors are field-replaceable units (FRU)
- AC or DC power supplies which are field-replaceable units

Cisco Embedded ASR1000-RP1 for Cisco ASR 1002 Router Description

The Cisco ASR 1000 Series route processor (embedded for the Cisco ASR 1002 Router) is the central control processor and runs the network operating system.

The Cisco embedded ASR1000-RP1 supports management interfaces such as the Ethernet network management port and console and auxiliary serial ports. It has LED status indicators, an RJ-45 plug for a BITS timing reference and one USB port which can be used with smart cards for secure key distribution or for image or configuration file updates.

The Cisco embedded ASR1000-RP1 deviates from the other ASR Series Route Processor 1 for the Cisco ASR 1006 router and the Cisco ASR 1004 Router in the following ways:

- Bulk file storage is on a large eUSB device (to 8GB (bytes) supported) with no SATA hard-drive supported.
- Redundant Cisco Router Processor 1 is not supported.
- Network clock changes. No second BITS clock input supported.
- A built-in 4xGE SPA is included. This shared port adapter provides 4 SFP-based GE connections.

Cisco Embedded ASR1000-SIP10 and SPAs for the Cisco ASR 1002 Router Description

The Cisco embedded ASR1000-SIP10 in the Cisco ASR 1002 Router is built into the Cisco ASR 1002 Router. The Cisco embedded ASR1000-SIP10 provides the physical and electrical termination for up to three half-height SPAs or one full-height and one half-height SPA. Double-wide SPAs are not supported. The fourth SPA slot is connected to the built-in 4xGE SPA that resides on the Cisco embedded ASR1000-RP1.

The Cisco embedded ASR1000-SIP10 interface, like the Cisco ASR 1006 Router and Cisco ASR 1004 Router, supports all Cisco embedded ASR1000-SIP10 functions and services. However, the Cisco embedded ASR1000-SIP10 differs in the following areas:

- Functions as the base board for Cisco embedded ASR1000-RP1

- Only supports three removable half-height SPAs on Bay 1, 2, and 3. The fourth SPA is a built-in 4xGE SPA on Bay 0, which is located on the Cisco embedded ASR1000-RP1.
- Is not a field-replaceable unit (FRU) and does not support online insertion and removal (OIR).

**Note**

The shared port adapters (SPAs) on the Cisco embedded ASR1000-SIP10 in the Cisco ASR 1002 Router do support online insertion and removal.

The Cisco ASR1002 Router embedded ASR1000-RP1 also provides the circuitry for the built-in 4xGE SPA. Some configurations of the Cisco ASR1002 Router will not populate the built-in 4xGE SPA and will have only three SPA bays available for interface cards.

Cisco ASR1000-ESP5 or ASR1000-ESP10 Description

The Cisco ASR 1002 Router supports the Cisco ASR1000-ESP5 or Cisco ASR1000-ESP10 embedded services processors. The Cisco ASR 1002 does not support the Cisco ASR1000-ESP20.

Figure 6-4 shows the Cisco ASR1000-ESP10 faceplate.

Figure 6-4 Cisco ASR1000-ESP10 LEDs

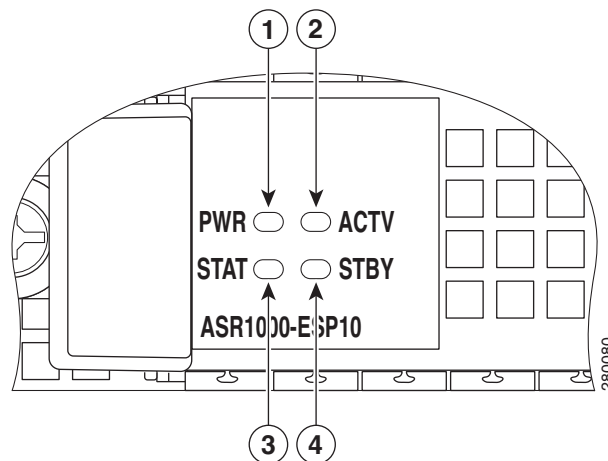


Table 6-1 lists the Cisco ASR1000-ESP5 or Cisco ASR1000-ESP10 LEDs and behaviors.

Table 6-1 Cisco ASR 1000-ESP5 or Cisco ASR1000-ESP10 LED Activity

No	LED Label	LED	Color	In the Power Up State -Behavior Description
1	PWR	Power	Solid green	All power supplies are within operational limits.
			Off	Off, the router is in standby mode.
2	ACTV	Active	Green	The embedded services processor is green when active.
3	STAT	STATUS	Green	Code has successfully downloaded and is operational.
			Yellow	BOOT ROM has successfully loaded.
			Red	Not booted.
4	STBY	Standby	None	Will always be off.



Note

The Cisco ASR 1000-ESP5 can only be used in the Cisco ASR 1002 Router.

Power Supplies in the Cisco ASR 1002 Router

The Cisco ASR 1002 Router power supply module consists of either an AC or DC input in a closed frame power supply with two DC voltage outputs: +12V and 3.3V. The AC power supply operates between 85VAC to 264VAC and DC operates between –40.5 to –72VDC. The DC and AC power supply shall current share on the 12V output and is used in a dual (redundant) hot pluggable system.

The power supplies are installed into the rear of the chassis and are hot pluggable. The Cisco ASR 1002 Router supports up to 588W input power from an infrastructure standpoint (cooling capacity, midplane and power distribution) but initial power supply development limit is up to 470W output (AC and DC Input).

AC Power Supply for Cisco ASR 1002 Router

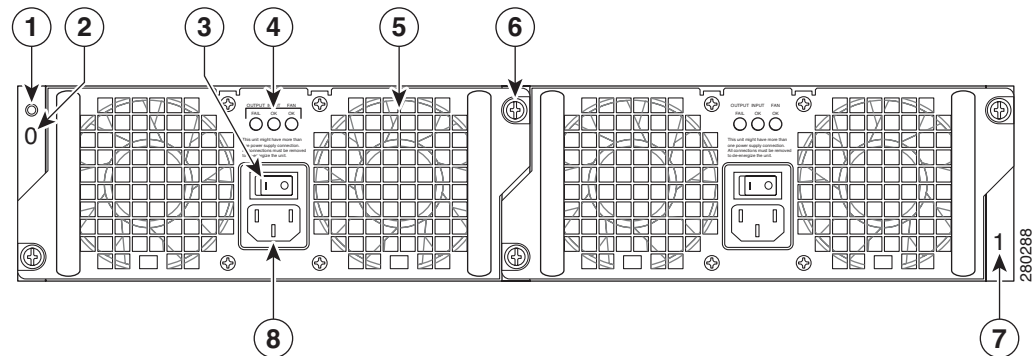
The AC power supply input inlet is an IEC connector with AC switch and the current rating on the connector and switch is 10 Amps. The AC power supply is secured into the chassis with two captive screws mounted on the faceplate.

Table 6-2 describes the AC power supply LEDs on the Cisco ASR 1002 Router.

Table 6-2 Cisco ASR 1002 Router AC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	Power supply activity	Green	LED is green and signals that the AC power supply input voltage is greater than 85V.
		None	If LED is not lighted, the AC input voltage is less than 70V or the power supply is turned off. For an AC input voltage between 70V and 85V the INPUT OK LED can be either on, off, or flashing
FAN OK	Power supply fan activity A bi-color LED indicates fan status.	Green	The LED is illuminated green when all fans are operational.
		Red	The LED is illuminated red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	LED is red. It is off to signal that the DC output voltages are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm and output voltages below the minimum or above the maximum will create an output fail alarm.

Figure 6-5 shows the AC Power Supply for the Cisco ASR1002 Router.

Figure 6-5 AC Power Supply for the Cisco ASR 1002 Router

1	Chassis ESD socket	5	AC power supply fan
2	AC power supply slot number 0	6	AC power supply captive installation screw
3	AC power supply On (I) /Off (O) switch	7	AC power supply slot number 1
4	AC power supply LEDs	8	AC power supply inlet

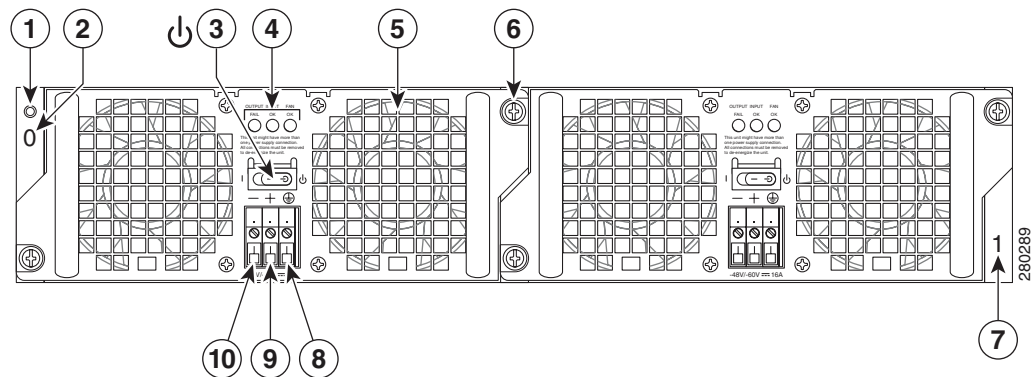
DC Power Supply for Cisco ASR 1002 Router

The DC power supply input connector is a euro-style terminal block and is compliant to all safety agencies and electrical requirements of the supply. The DC power supply operates within specification from -40.5VDC to -72VDC continuously once the power supply DC input turn on threshold of -43.5V has been reached.

The DC power input connector euro-style terminal block will accept three wires: one positive polarity, one negative polarity, and one earth ground wire. There is provisions on the front panel to wire tie and strain relief the DC input wiring. The connection order shall be negative (-), positive (+), **GND**. The DC power supply is secured into the system chassis with two captive screws mounted on the faceplate.

Figure 6-6 shows the DC Power Supply for the Cisco ASR1002 Router.

Figure 6-6 DC Power Supply for the Cisco ASR 1002 Router



1	Chassis ESD socket	6	DC power supply captive installation screw
2	DC power supply slot 0 label	7	DC power supply slot 1 label
3	DC power supply switch Standby/On (I) (standby symbol is a broken circle with a vertical line through the top of it)	8	Earth ground lead
4	DC power supply LEDs	9	Positive lead
5	Fan	10	Negative lead

The Cisco ASR 1002 Router DC power supply LEDs are defined in [Table 6-3](#).

Table 6-3 Cisco ASR 1002 Router DC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	A bi-color LED indicates presence of input voltage	Green	LED illuminates green to signal that the DC power supply input voltage is greater than 43.5VDC at turn-on and remains green down to 39VDC.
		Amber	The LED illuminates amber if the power supply turns off due to low input voltage (falls below 39VDC) and indicates that there is still a hazard present (voltage on the terminal block). The LED remains amber and is active to around 20V +/-5V. The LED is not illuminated if the input is below 15V.
FAN OK	A bi-color LED indicates power supply fan status	Green	The LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	<p>When the LED is off, it signals that the DC output voltage are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an Output Fail alarm.</p> <p>Led illuminates red to indicate that the DC output is out of the specified range.</p> <p>When you turn the power supply on, the red LED illuminates for two to three seconds to test LED operation before going off.</p>

The output voltage alarm is declared when the output voltage is below the low end of the minimum or above the high end of the maximum limits. When the output voltage is above the high end of the minimum or below the low end of the maximum limits, the Red state will not be activated.

[Table 6-4](#) shows the DC power supply output voltage alarm range.

Table 6-4 DC Power Supply Output Voltage Alarm Threshold Ranges

Output	Minimum	Maximum
12V	10.0-11.2V	12.8-13.8V
3.3V	2.6 - 3.0V	None

Installation Methods

Cisco ASR 1002 Router is designed for standalone, two rail 19-inch rack-mount (front rail only), four rail 19-inch rack-mount (front and rear rail).

Although rack-mounting is the preferred method of installation for the Cisco ASR 1002 Router, you can mount the chassis on an equipment shelf or tabletop.

**Note**

The Cisco ASR 1002 Router usually ships fully loaded. However, you can remove components from the chassis to make the chassis lighter for your rack installation, such as the power supplies.

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

**Warning**

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for Cisco ASR 1000 Series Aggregation Services Routers* publication. This document provides important safety information you should know before working with the system. Statement 200

**Note**

You have already unpacked your chassis and read all the site requirements for your new equipment. Proceed with the installation.

General Rack Installation Guidelines

When planning your rack installation, consider the following guidelines:

- The Cisco ASR 1002 Router requires a minimum of 3.5 inches or 8.9 cm rack units of vertical rack space. Measure the proposed rack location before mounting the chassis in the rack.
- Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rack-mount installation, remove the power strip before installing the chassis, and then replace it after the chassis is installed.
- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or moving cards, connecting cables, or replacing or upgrading components). Otherwise, allow 19 inches (48.3 cm) of clearance to remove field-replaceable units.
- Maintain a minimum clearance of 3 inches on the front and back sides of the chassis for the cooling air inlet and exhaust ports, respectively. Avoid placing the chassis in an overly congested rack or directly next to another equipment rack; otherwise, the heated exhaust air from other equipment can enter the inlet air vents and cause an overtemperature condition inside the router.

**Caution**

To prevent chassis overheating, never install a Cisco ASR 1002 Router in an enclosed room that is not properly ventilated or air conditioned.

- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity to prevent the rack from falling over.
- Install and use the cable-management brackets included with the Cisco ASR 1002 Router to keep cables organized and out of the way of the cards and processors. Ensure that cables from other equipment already installed in the rack do not impair access to the cards or require you to disconnect cables unnecessarily to perform equipment maintenance or upgrades.

- Install rack stabilizers (if available) before you mount the chassis.
- Provide an adequate chassis ground (earth) connection for your router chassis.

In addition to the preceding guidelines, review the precautions for avoiding excessive temperature conditions in the [“Site Environmental Requirements”](#) section on page 3-8.

Table 6-5 provides the Cisco ASR 1002 Router dimensions and weight information.

Table 6-5 Cisco ASR 1002 Router Dimensions and Weight

Cisco ASR 1002	Dimensions
Depth	22.50 in. (57.15 cm) (including card handles, cable-management brackets, power supply handles).
Height	3.47 in. (8.813 cm) - 2RU rack-mount per EIA RS-310
Width	17.25 in. (43.815 cm) - 19 inch rack-mount
Weight	40 lb (18.143 k) - fully configured

Guidelines for an Equipment Shelf or Tabletop Installation

The chassis should already be in the area where you will install it. If you have not determined where to install your chassis, see [Cisco ASR 1000 Series Routers Components](#), page 2-1 for information about site considerations.

If you are not rack-mounting your Cisco ASR1000 series chassis, place it on a sturdy equipment shelf or tabletop.

When installing the Cisco ASR 1002 Router on an equipment shelf or tabletop, ensure that the surface is clean and that you have considered the following:

- The Cisco ASR 1002 Router requires at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents (the front and top/rear sides of the chassis).
- The Cisco ASR 1002 Router should be installed off the floor. Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.
- There must be approximately 19 inches (48.3 cm) of clearance at the front and rear of the chassis to install and replace FRUs, or to access network cables and equipment.
- The Cisco ASR 1002 Router needs adequate ventilation. Do not install it in an enclosed cabinet where ventilation is inadequate.
- Have the cable-management bracket available if you plan to install it on the front of the chassis.
- An adequate chassis ground (earth) connection exists for your router chassis (see the [“Attaching a Chassis Ground Connection”](#) section on page 6-23).
- Always follow proper lifting practices as outlined in the [“Electrical Safety”](#) section on page 3-18, when handling the chassis.

Equipment Shelf or Tabletop Installation

To mount your Cisco ASR 1002 Router on an equipment shelf or tabletop, follow these steps.

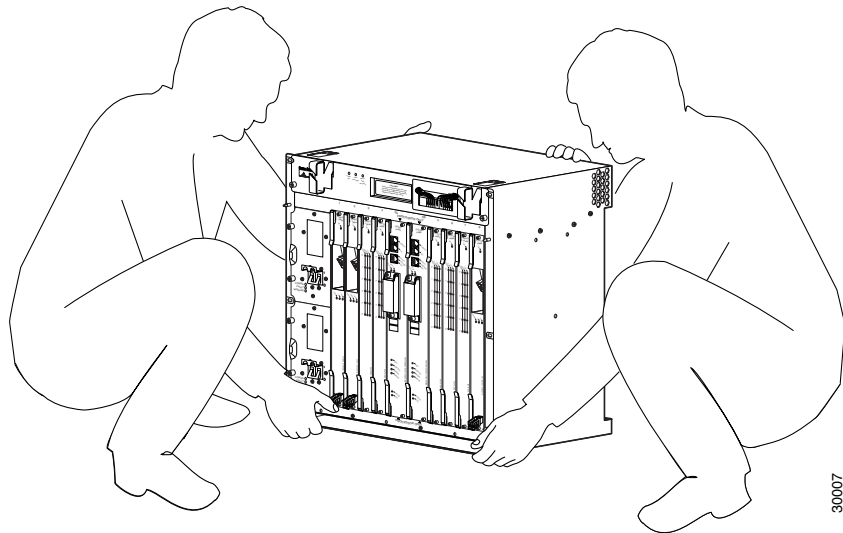
- Step 1** Remove any debris and dust from the tabletop or platform, as well as the surrounding area.
- Step 2** Lift the chassis into position on the equipment shelf or tabletop.



Warning

At least two people are required to lift the chassis onto a tabletop or platform. To prevent injury, keep your back straight and lift with your legs, not your back. Statement 164

Figure 6-7 *Lifting the Chassis*



Note

The chassis in [Figure 6-7](#) does not represent the Cisco ASR 1002 Router.

- Step 1** Attach the front rack-mount brackets. Locate the threaded holes in the front sides of the chassis (first holes beyond the vent holes) and use the package of black screws that shipped with the chassis.
- Step 2** Align the front rack-mount bracket to one side of the chassis.
- Step 3** Insert and tighten the screws on one side.
- Step 4** Repeat Step 2 through Step 3 on the other side of the chassis. Use all screws to secure the rack-mount brackets to the chassis.



Note

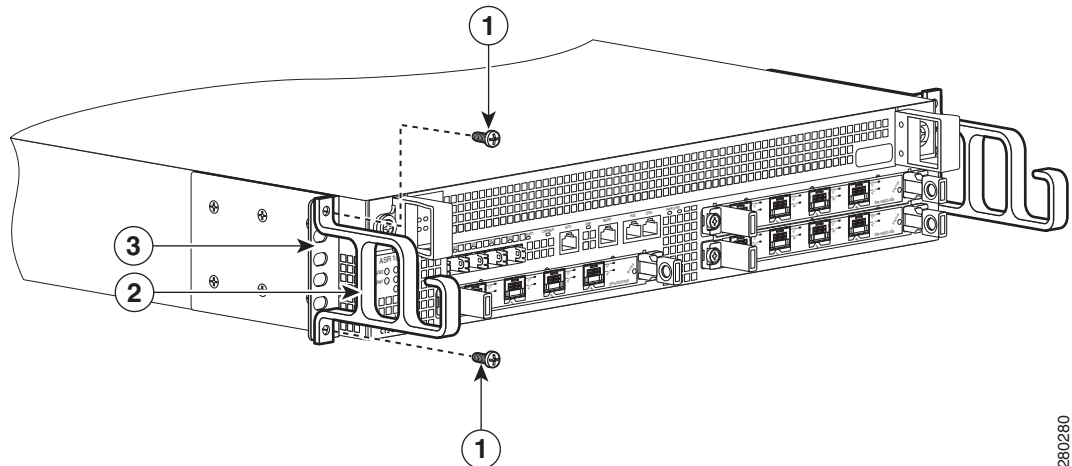
The chassis rack-mount brackets must be installed first so that you can attach the cable-management brackets to the chassis rack-mount brackets after the chassis is installed in the rack.

- Step 5** Obtain the two cable-management brackets and screws shipped with your chassis. [Figure 6-8](#) shows attached cable-management brackets on the front of the Cisco ASR 1002 Router.

**Note**

Make certain that the cable-management ‘U’ feature device has the open end pointing upwards when you attach it to the chassis

Figure 6-8 Attaching the Cable-Management Brackets to the Cisco ASR 1002 Router



1	Cable-management bracket top and bottom screw	3	Chassis front rack-mount bracket
2	Cable-management bracket		

- Step 6** Screw the cable-management bracket to each side of the rack-mount brackets already attached to the chassis. Use two screws for each cable-management bracket. Use the package of four screws.
- Step 7** Check that all screws are securely tightened.
- Step 8** Go to the [“Attaching a Chassis Ground Connection”](#) section on page 6-23 to continue the installation.

Rack-Mounting a Cisco ASR 1002 Router

The Cisco ASR 1002 Router can be installed in an existing rack with equipment or in an empty rack with no equipment: The chassis can be mounted in either rack types:

- Two-post rack, either 19 inch or 23 inch. Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 3.47 inches (8.8 cm). Airflow through the chassis is from front to back.

**Note**

If you are using a two-post rack secure the rack to the floor surface to prevent tipping and avoid bodily.

- Four post, 19-inch equipment rack. Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 3.47 inches (8.8 cm). Airflow through the chassis is from front to back.

**Note**

When handling the chassis, always follow proper lifting practices, see [Chassis-Lifting Guidelines](#), page 3-20.

The Cisco ASR 1002 Router can be installed with both front or rear rack-mount brackets.

Verifying Rack Dimensions

Before you install the chassis, measure the space between the vertical mounting flanges (rails) on your equipment rack to verify that the rack conforms to the measurements shown in [Figure 6-9](#).

Step 1 Mark and measure the distance between two holes on the left and right mounting rails.

The distance should measure 18.31 inches \pm 0.06 inches (46.5 cm \pm 0.15 cm).

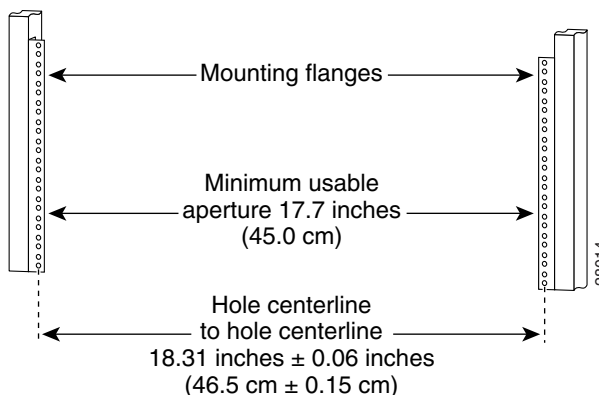
**Note**

Measure for pairs of holes near the bottom, middle and top of the equipment rack to ensure that the rack posts are parallel.

Step 2 Measure the space between the inner edges of the left front and right front mounting flanges on the equipment rack.

The space must be at least 17.7 inches (45 cm) to accommodate the chassis which is 17.25 inches (43.8 cm) wide and fits between the mounting posts on the rack.

Figure 6-9 Verifying Equipment Rack Dimensions



Attaching the Chassis Rack-Mount Brackets

This section explains how to attach the front and rear rack-mount brackets to the chassis. Before installing the chassis in the rack, you must install the rack-mount brackets on each side of the chassis.

The parts and tools required for installing the rack-mount brackets and cable-management brackets are listed in the “Tools and Equipment” section on page 3-21.



Note

The cable-management brackets are attached to the chassis after you install the chassis rack-mount brackets on the chassis and mount the chassis in the rack.

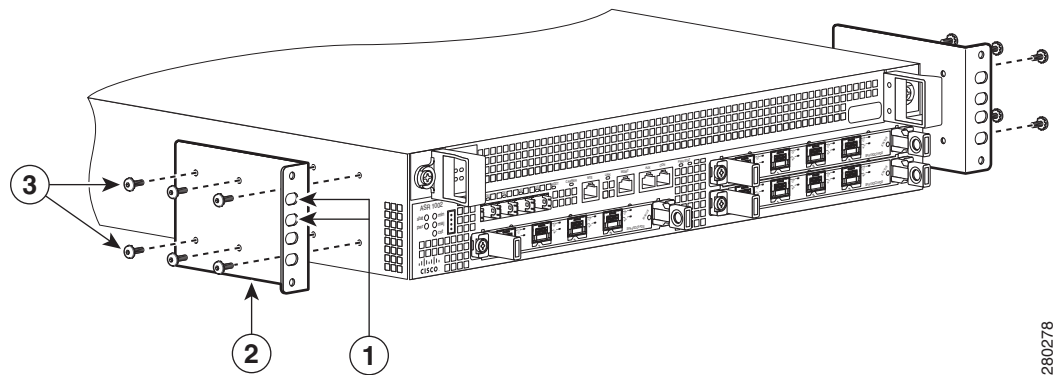
Chassis Front Rack-Mount Brackets

Determine where in the rack you want the chassis to be mounted. If you are mounting more than one chassis in the rack, then start from the bottom up or the center of the rack. Figure 6-10 shows the brackets attached to the chassis. Depending on the bracket holes you use, the chassis may protrude in the rack.

To install the front rack-mount brackets on a Cisco ASR 1002 Router, complete the following steps:

- Step 1** Locate the threaded holes on the side of the chassis. Make certain that you hold the front rack-mount bracket with the ear and holes facing outward and towards the front of the chassis (see Figure 6-10). Figure 6-10 shows where to attach the front rack-mount brackets to the Cisco ASR 1002 Router.

Figure 6-10 Attaching the Front Rack-Mount Brackets to the Cisco ASR 1002 Router



1	Front rack-mount bracket ear and holes	3	Front rack-mount bracket screws
2	Front rack-mount bracket		

- Step 2** Position the front rack-mount bracket top hole with the chassis first top hole behind the side vent holes.
- Step 3** Insert and tighten the black screws on one side.
- Step 4** Repeat Step 1 through Step 3 on the other side of the chassis. Use black screws to secure the rack-mount brackets to the chassis.

- Step 5

Install the chassis in a rack. To install the Cisco ASR 1002 Router in a rack, go to the [Installing the Cisco ASR 1002 Router in a Rack, page 6-17](#).

This completes the steps for attaching the front rack-mount brackets to the Cisco ASR 1002 Router.

Chassis Rear Rack-Mount Brackets

If you are rack mounting the chassis using the rear rack-mount brackets, then this type of installation provides for the chassis being recessed in the rack.

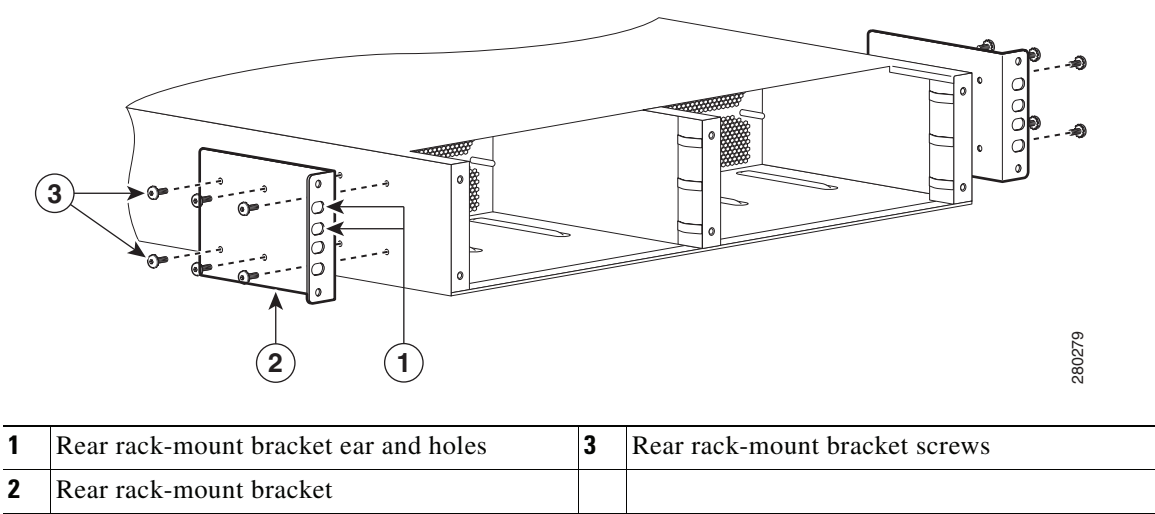
To install the rear rack-mount brackets on a Cisco ASR 1002 Router, complete the following steps:

- Step 1

Locate the threaded holes on the rear side of the chassis. Make certain that you hold the rear rack-mount bracket with the ear and holes facing outward and towards the rear of the chassis.

Figure 6-11 shows where to attach the rear rack-mount brackets to the Cisco ASR 1002 Router.

Figure 6-11 Attaching the Rear Rack-Mount Brackets to the Cisco ASR 1002 Router



1	Rear rack-mount bracket ear and holes	3	Rear rack-mount bracket screws
2	Rear rack-mount bracket		

- Step 2

Position the rear rack-mount bracket top hole with the chassis top hole from the back.
- Step 3

Insert and tighten the screws on one side.
- Step 4

Repeat Step 1 through Step 3 on the other side of the chassis. Use the remaining screws to secure the rear rack-mount brackets to the chassis.

This completes the steps for attaching the rear rack-mount brackets to the Cisco ASR 1002 Router.



Caution

To make installation easier, before you mount the ASR 1002 Router in a rack, make certain you read which rack-mount bracket ear holes to use when positioning the chassis in the rack. As a result of using the designated ear holes on the rack-mount bracket, the cable-management bracket installation will be made easier.

Installing the Cisco ASR 1002 Router in a Rack

After installing the rack-mount brackets on the chassis, you mount the chassis by securing the rack-mount brackets to two posts or mounting strips in the rack using the screws provided. Because the rack-mount brackets support the weight of the entire chassis, be sure to use all screws to fasten the two rack-mount brackets to the rack posts.



Warning

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

-This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

-When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

-If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006

We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

To install the chassis in the rack, complete the following steps:

- Step 1** On the chassis, ensure that all screw fasteners on the installed components are securely tightened.
- Step 2** Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized. See the next sections on the types of racks you can use to install the chassis.
- Step 3** (Optional) Install a shelf in the rack to support the Cisco ASR 1002 Router. If you use a shelf, this will help support the chassis while you secure it to the rack.
- Step 4** With two people, lift the chassis into position between the rack posts.
- Step 5** Align the mounting bracket holes with the rack post holes and attach the chassis to the rack.



Note

If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis.

- Step 6** Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.



Tip

To allow space to attach the cable-management brackets to the chassis in the rack easily, make certain that you use the rack-mount bracket ear holes specified in the next steps.

- Step 7** Hold the chassis in position against the mounting rails in the equipment rack and follow these steps:
 - a.** Insert the bottom screw into the second hole up from the bottom of the rack mount ear and use a hand-held screwdriver to tighten the screw to the rack rail.



Tip

To make installation easier, insert one screw at the bottom of the chassis and the next screw at the top of the chassis diagonally from the first screw.

- b. Insert the top screw into the second hole from the top of the rack mount ear diagonally from the bottom screw and tighten the screw to the rack rail.
- c. Insert the four screws to secure the chassis to the rack equipment.

**Tip**

As a result of using the specified rack-mount bracket ear holes, the cable-management bracket can be easily attached to the rack-mount bracket when the chassis is in the rack.

- Step 8** Tighten all screws on each side to secure the chassis to the equipment rack.

Two-Post Rack Installation

The Cisco ASR 1002 Router can be installed in a two-post rack, either 19 inch or 23 inch.

**Note**

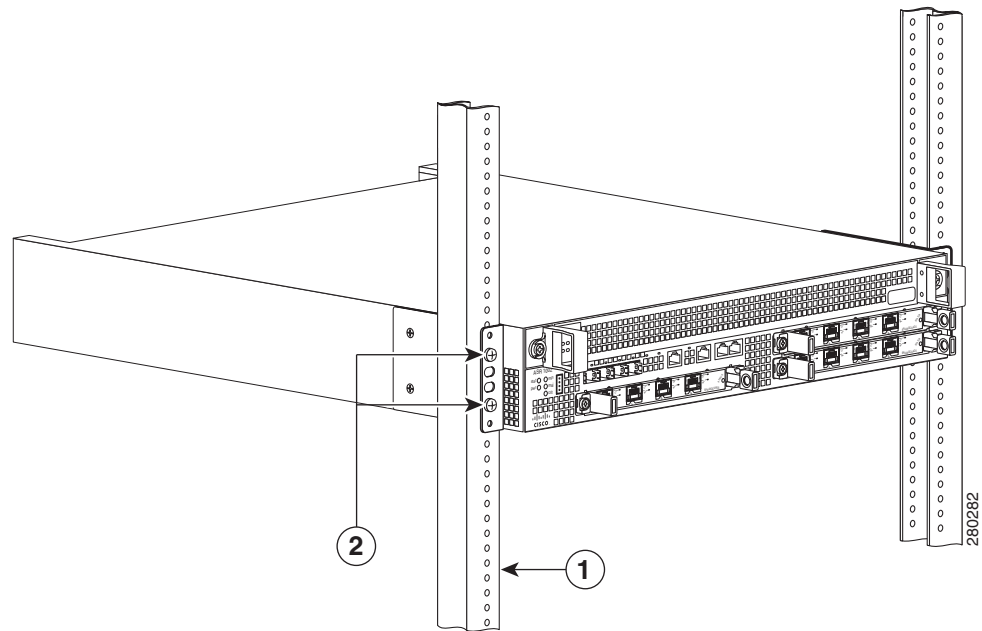
Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 3.47 inches (8.8 cm). Airflow through the chassis is from front to back.

**Caution**

If you are using a two-post rack secure the rack to the floor surface to prevent tipping and avoid bodily injury and component damage.

- Step 1** Position the chassis so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.

Figure 6-12 shows where to attach the rear rack-mount brackets to the Cisco ASR 1002 Router.

Figure 6-12 Attaching the Rear Rack-Mount Brackets to the Cisco ASR 1002 Router

1	Rack equipment rail	2	Rack-mount bracket ear and holes
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- Step 2** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 3** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 4** For each bracket, insert and tighten two screws to the rack on both sides.

This completes the procedure for installing the chassis in a two-post rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 6-23 to continue the installation.

Four-Post Rack Installation

The Cisco ASR 1002 Router can be flush-mounted in a 19-inch equipment rack using the rack-mounting kit provided with your system. The Cisco ASR 1002 Router can be mounted into the rack using two recommended methods:

- Installing the chassis in an existing rack with equipment.
- Installing an empty chassis in a rack with no equipment installed.

When handling the chassis, always follow proper lifting practices, see [Chassis-Lifting Guidelines](#), page 3-20.



Note

Inner clearance (the width between the inner sides of the two posts or rails) must be at least 19 inches (48.26 cm). The height of the chassis is 3.47 inches (8.8 cm). Airflow through the chassis is from front to back.

**Note**

Make sure the rack is stabilized.

Step 1 (Optional) Install a shelf in the rack to support the Cisco ASR 1002 Router. If you are using a shelf then raise the chassis to the level of the shelf. Let the bottom of the chassis rest on the brackets, but continue to support the chassis. Using two people, lift the chassis into the rack using the side handles and grasping underneath the power supply bays.

Step 2 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

**Note**

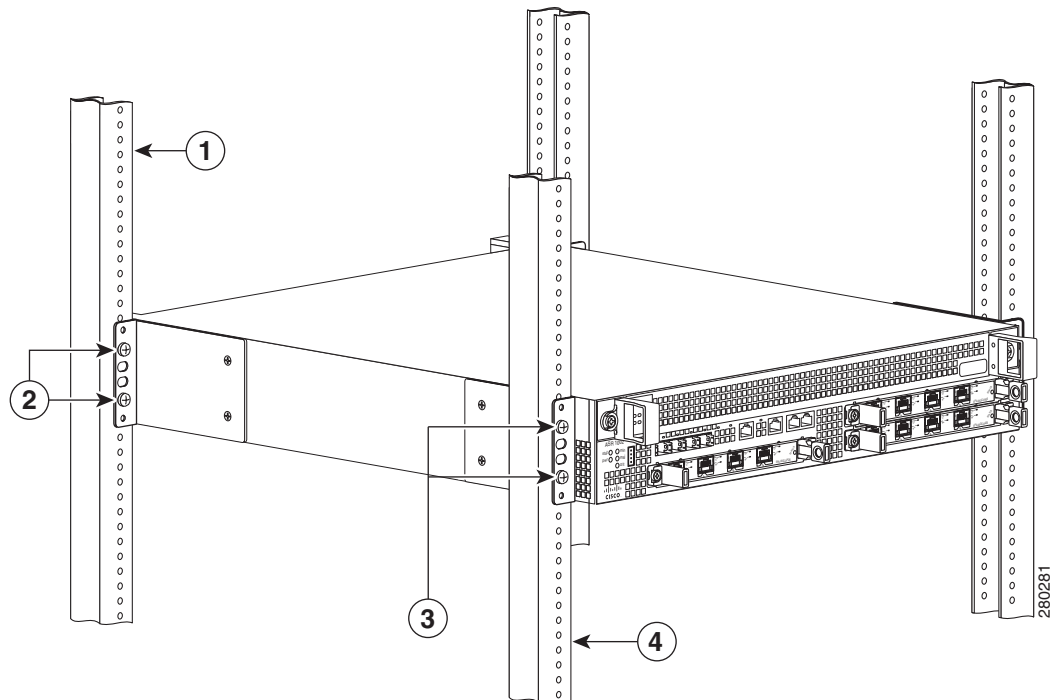
Use the second hole up from the bottom of the rack-mount bracket and the second hole down from the top of the rack-mount bracket. This will make it easier to attach the cable-management bracket to the chassis in the equipment rack.

Step 3 Hold the chassis in position against the mounting rails while the second person finger-tightens a screw to the rack rails on each side of the chassis.

Step 4 Finger-tighten screws to the rack rails on each side of the chassis.

Step 5 Tighten all screws on each side to secure the chassis to the equipment rack.

Figure 6-13 Cisco ASR 1002 Router in a Four Post Rack - Front and Rear Rack-Mounting



1	Rear rack equipment rail	3	Front rack-mount bracket ear and holes
2	Rear rack-mount bracket ear and holes	4	Front rack equipment rail

- Step 6** Use a level to verify that the tops of the two brackets are level, or use a measuring tape to verify that both brackets are the same distance from the top of the rack rails.
-

This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching the Cable-Management Bracket” section on page 6-21](#) to continue the installation.

Attaching the Cable-Management Bracket

The cable-management brackets mount to each rack-mount bracket on the chassis to provide cable-management to both sides of the chassis (parallel with card orientation). These brackets are screw mounted to the rack-mount brackets to allow easy installation and removal of cables.

The cable-management brackets for the Cisco ASR 1002 Router contain one independent cable-management “U” type features with four screws and provides cable dressing of each card module slot.

**Note**

Make certain that the cable-management bracket “U” type feature is facing upwards when you attach it to the chassis.

Follow these steps to attach the cable-management brackets to both sides of the Cisco ASR 1002 Router in the rack:

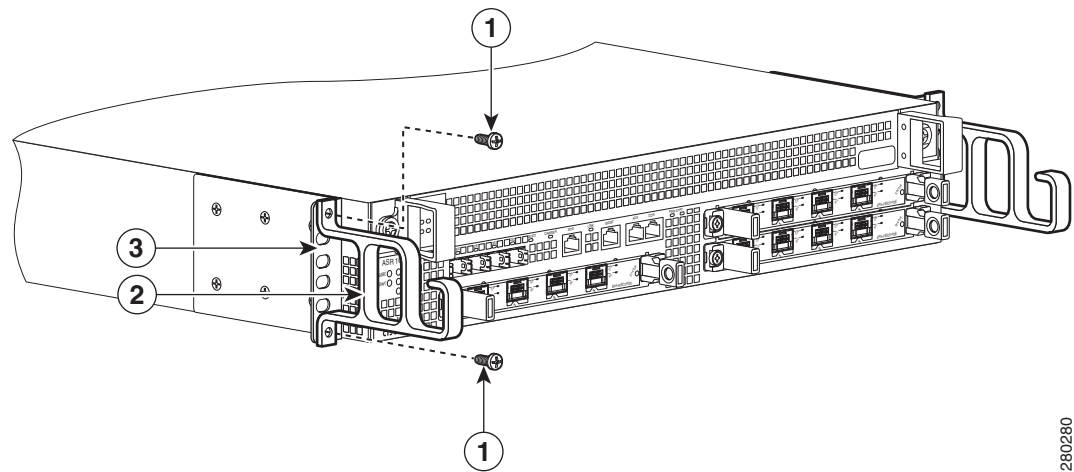
- Step 1** Align the cable-management bracket to the rack-mount bracket on one side of the Cisco ASR 1002 Router. The cable-management bracket aligns to the top hole of the chassis rack-mount bracket.
- Step 2** Using a Phillips screwdriver, insert the screw through cable-management bracket and into the chassis rack-mount and tighten the screw.

**Note**

Use the package of screws that came with your chassis containing four screws.

[Figure 6-14](#) shows where to attach the front rack-mount brackets to the Cisco ASR 1002 Router in a rack.

Figure 6-14 Chassis Rack-Mount Bracket Ear Holes for the Cable-Management Bracket



280280

1	Secure the cable-management top screw and bottom to this ear hole	3	Front rack-mount bracket
2	Cable-management bracket		

Step 3 Using the bottom rack-mount ear hole, insert the screw through cable-management bracket and into the chassis rack-mount (see [Figure 6-14](#)).

This completes the procedure for installing the cable-management brackets on the chassis.

Attaching a Chassis Ground Connection

Connecting the Cisco ASR 1002 chassis to earth ground is required for all DC powered installations and any AC powered installation where compliance with Telcordia grounding requirements is necessary.

**Caution**

The dual-lug chassis ground stud must be installed, all cards or filler plates must be fully inserted and screwed in and earthed to prevent a potential hazard in a telecom line.

Have the recommended tools and supplies available before you begin this procedure.

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Before you connect power or turn on power to your chassis, you must provide an adequate chassis ground (earth) connection for the chassis. The chassis ground lug (two) and the respective screws (four) are provided in the accessory kit that ships with your Cisco ASR 1002 Router.

**Caution**

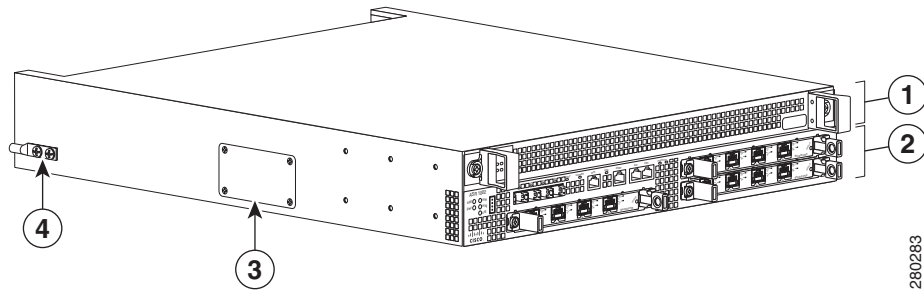
The grounding wire is always the first to be installed or connected and the last to be removed or disconnected.

The following tools, equipment, and supplies necessary to connect the system ground to the chassis:

- Phillips screwdriver
- Dual-lug chassis ground component (two) and respective screws (four) (shipped with the accessory kit)
- Grounding wire

Figure 6-15 shows the location of the dual ground lug on the side of the of Cisco ASR 1002 Router.

Figure 6-15 Cisco ASR 1002 Router Chassis Ground Lug Location and Side Panel Door

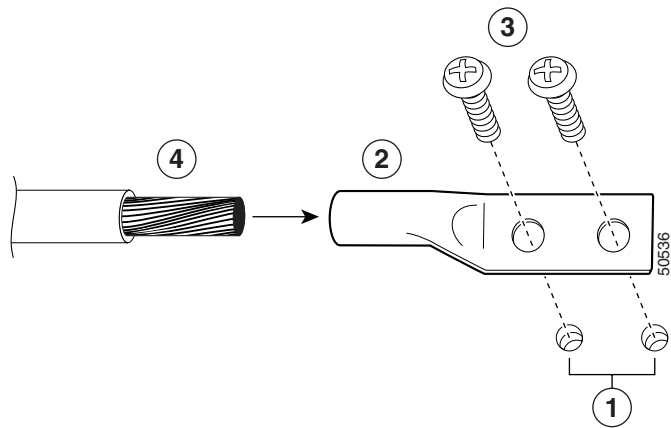


1	F0 with ASR1000-ESP5 or ESP10.	3	The eUSB panel door on the side of the Cisco ASR 1002 Router must not be opened. If there is a problem with eUSB flash card, the chassis should be returned.
2	R0 slot with embedded ASR1000-RP1 and embedded ASR1000-SIP10.	4	Cisco ASR 1002 Router ground stud location.

To attach the grounding lug to the chassis ground connector on your chassis, follow these steps:

- Step 1
- Use the wire stripper to strip one end of the AWG #6 wire approximately 0.75 inches (19.05 mm).
- Step 2
- Insert the AWG #6 wire into the wire receptacle on the grounding lug. Use the manufacturers’s recommended crimping tool to carefully crimp the wire receptacle around the wire; this step is required to ensure a proper mechanical connection.

Figure 6-16 Attaching a Grounding Lug to the Chassis Ground Connector

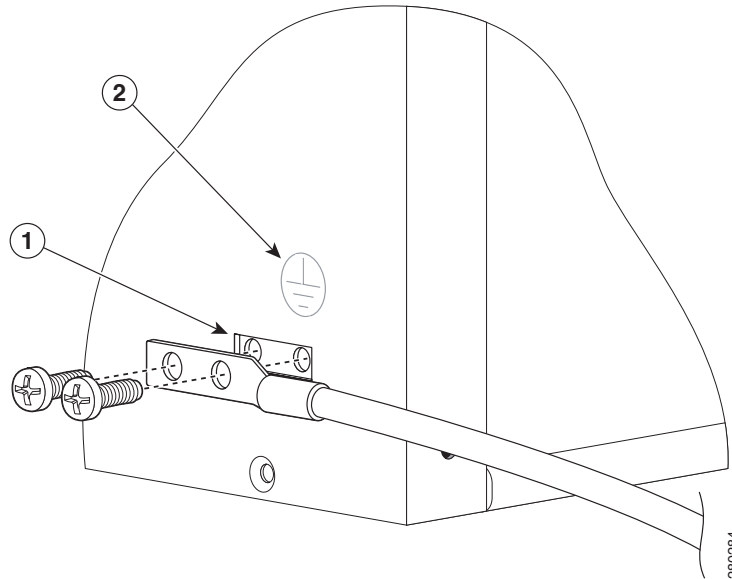


1	Chassis ground connector holes	3	Ground lug screws
2	Grounding lug	4	Ground wire

- Step 3
- Attach the grounding lug with the wire on the left to avoid having the grounding wire overlapping the power supply.

Step 4 Locate the chassis ground connector on the side of your chassis.

Figure 6-17 Attaching a Grounding Lug to the Chassis Ground Connector



1	Chassis ground connector	2	Earth ground symbol
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Step 5 Insert the two screws through the holes in the grounding lug.

Step 6 Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not overtighten the screws.

Step 7 Connect the opposite end of the grounding wire to the appropriate grounding point at your site to ensure an adequate chassis ground.

This completes the procedure for attaching a chassis ground connection. Go to the following cabling sections for information on attaching cables.

Connecting Shared Port Adapter Cables

The instructions for connecting the cables for the shared port adapter installed in the Cisco ASR 1002 Router are contained in the respective configuration documents for each port adapter. For example, if you are connecting the optical fiber cables for the PA-POS-OC3 port adapter, refer to the configuration note *PA-POS-OC3 Packet OC-3 Port Adapter Installation and Configuration Guide* at <http://www.cisco.com/univercd/cc/td/doc/product/core>

Connecting Console and Auxiliary Port Cables

This section describes how to attach a cable to the Cisco embedded ASR1000-RP1 console or auxiliary ports on the Cisco ASR 1002 Router. The Cisco ASR 1002 Router uses RJ-45 ports for both the auxiliary port and console port to attach a modem or console terminal.


Caution

Both the console and the auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.) To meet Class A emissions requirements, shielded cables must be used for the console and auxiliary port connectors.

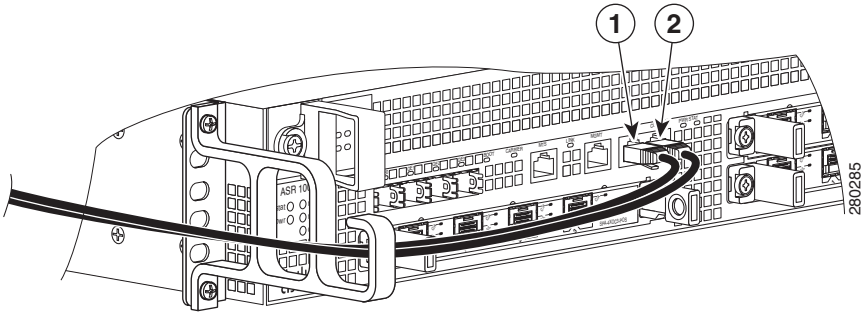
Before you can use the console interface on the router using a terminal or PC, you must perform the following steps:

- Step 1**
- Before connecting a terminal to the console port, configure the terminal to match the chassis console port as follows: 9600 baud, 8 data bits, no parity, 1 stop bits (9600 8N1).
- Step 2**
- Connect to the port using the RJ-45 to DB-9 cable.


Note

For information about how to change the default settings to meet the requirements of your terminal or host, refer to the *Cisco IOS Terminal Services Configuration Guide*.

Figure 6-18 Cisco ASR 1002 Router Embedded ASR1000-RP1 Console and Auxiliary Port Connectors



1	CON—console port	2	AUX —auxiliary port
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- Step 3**
- After you establish normal router operation, you can disconnect the terminal.

Management Ethernet Port Cable Connection



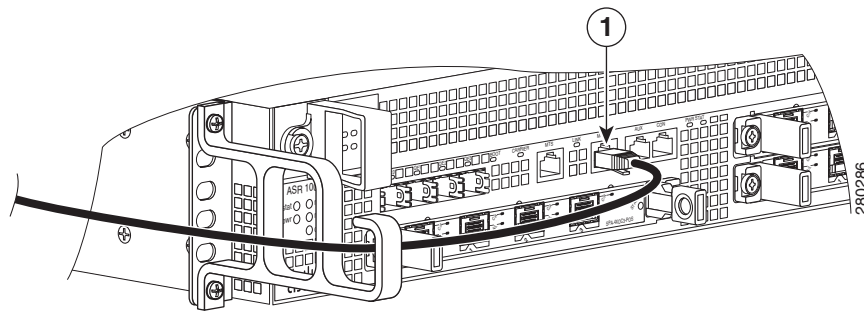
Caution

To comply with Class A emissions requirements, a shielded Ethernet cable must be used for the connection.

To use the Management Ethernet interface on the router, perform the following steps:

- Step 1** Insert an Ethernet RJ-45 cable into the MGMT ETHERNET port (see [Figure 6-19](#)).

Figure 6-19 Cisco ASR 1002 Router Embedded ASR1000-RP1 Management Port Connector



1 MGMT - management port and cable

- Step 2** Insert the other end of the RJ-45 cable to your management device or network.

Connecting Power to Cisco ASR 1002 Router



Warning

The covers are an integral part of the safety design of the product. Do not operate the unit without the covers installed. Statement 1077



Warning

When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

**Warning**

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

This section provides the procedures for connecting AC-input and DC-input power to your Cisco ASR 1002 Router.

The DC power supply for the Cisco ASR 1006, ASR 1004, and ASR 1002 routers operate at individual specifications. [Table 6-6](#) shows the common input ranges and circuit breaker requirements.

Table 6-6 Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps		AWG # Wire	
		Minimum	Maximum	Minimum	Maximum
Cisco ASR 1006	40	Always 50		Always AWG #6 wire	
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20Amp circuit breaker and an AWG #10 gauge wire for a 30Amp circuit breaker.

**Note**

All Cisco ASR 1000 Series Router AC power supplies require a 20 AMP circuit breaker.

**Note**

Detailed instructions for removing and replacing the Cisco ASR1002 Router AC and DC power supplies are in [Removing and Replacing a Cisco ASR 1002 Router Power Supply](#), page 8-40.

Read the safety warnings before you begin.

**Warning**

Never install an AC power module and a DC power module in the same chassis. Statement 1050

**Warning**

Installation of the equipment must comply with local and national electrical codes. Statement 1074

**Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

This unit has two power supply connections. All connections must be removed to de-energize the unit.
Statement 1028

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies 20 A and DC power supplies 30 A.
Statement 1005

Connecting AC-Input Power to Cisco ASR 1002 Router

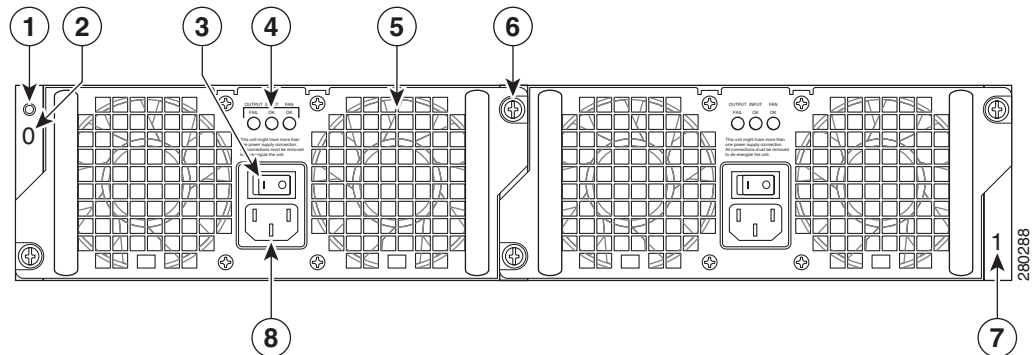
To connect AC power to the Cisco ASR 1002 Router, follow these steps:

- Step 1** At the rear of the router, check that the power switch is in the Off (O) position.

**Note**

Turn the power switch to the On (I) position after both sides of the power cord are connected.

Figure 6-20 Cisco ASR 1002 Router AC Power Supply Labels



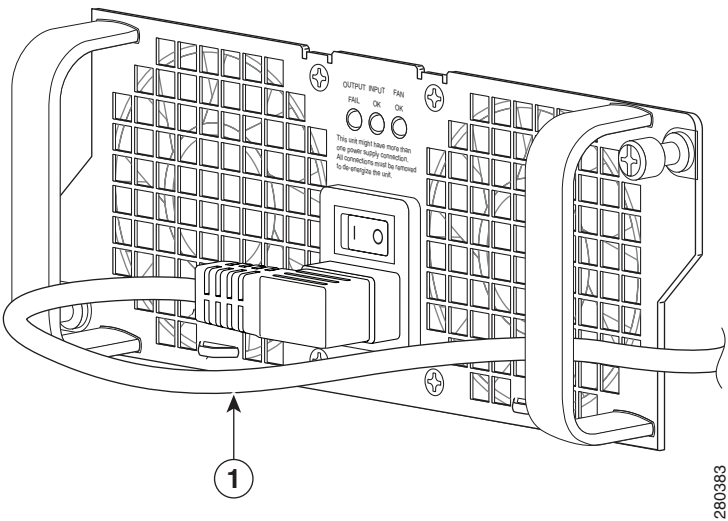
1	Chassis ESD socket	5	AC power supply fan
2	AC power supply slot number 0	6	AC power supply captive installation screw
3	AC power supply On (I) /Off (O) switch	7	AC power supply slot number 1
4	AC power supply LEDs	8	AC power inlet

- Step 2** Insert the AC power cable into the power supply AC inlet.

- Step 3** To ensure that the AC power cord does not interfere with other cables or wires, dress the AC power cable in one of the following ways.

- Leave a small service loop in the AC power cord from the inlet and then secure the power cord through the AC power supply handle as shown in [Figure 6-21](#). Or go to step b.

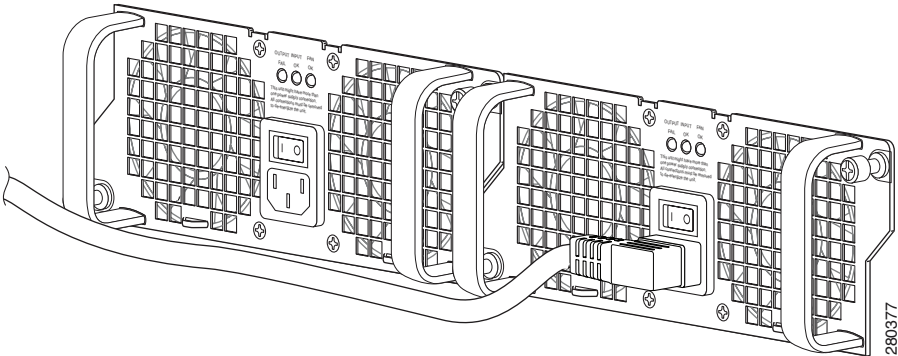
Figure 6-21 Positioning Cisco ASR 1002 Router AC Power Supply and Cord in Slot 1



1	AC power cord		
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- b. Take the power cord and run it below the handles of the right and left power supplies. Make sure the power cord is hanging loose so that it will not be disconnected from the AC power inlet as shown in Figure 6-22.

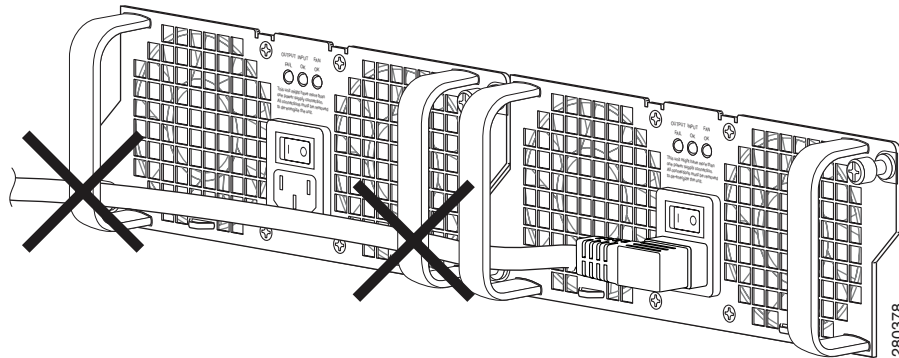
Figure 6-22 Cisco ASR 1002 Router AC Power Supply in Slot 0 and Slot 1 With Power Cord



**Caution**

Do not run the AC power cord through the power supply handles as shown in [Figure 6-23](#).

Figure 6-23 *Incorrect Cabling on Cisco ASR 1002 Router AC Power Supply*

**Note**

Using a tie wrap for the AC power cable is optional and not necessary. However, if you do attach the AC power cable to a power supply tab and then you remove the AC power cable for some reason, check for any damage to the cable after you cut the tie wrap off. If the power cord is damaged, replace it immediately.

Step 4 Plug the AC power supply cable into the AC power source.

This completes the procedure for connecting an AC power supply in the Cisco ASR 1002 Router.

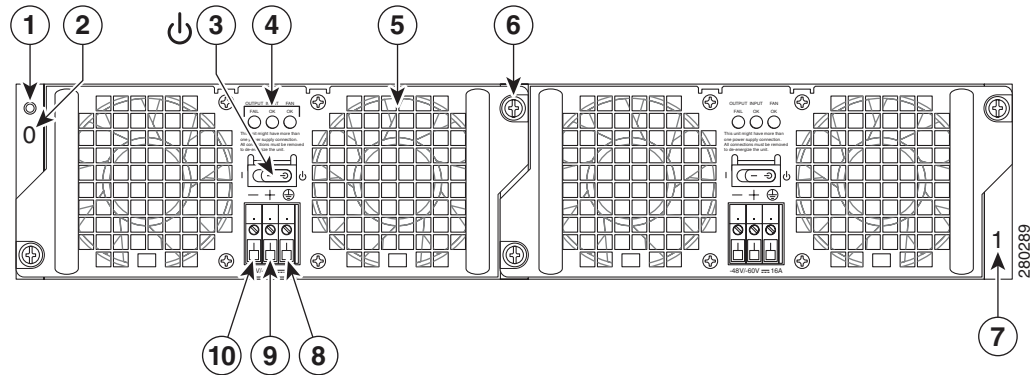
Connecting DC-Input Power to Cisco ASR 1002 Router

The DC power supply input connector is a euro-style terminal block. A means to provide strain relief to the input wires is provided on the power supply. The connection order is negative (–), positive (+), and GND; but this is the order from left to right that the terminals appear on the power supply, not the order in which the leads should be connected during installation. The order the leads should be attached is GND, positive (+), and negative (–).

The recommended branch circuit breaker for the Cisco ASR 1002 Router DC power supply is 30Amp. Use a AWG #10 wire gauge on the 30Amp circuit.

Figure 6-24 shows the DC power supply for the Cisco ASR 1002 Router.

Figure 6-24 DC Power Supply for the Cisco ASR 1002 Router



1	Chassis ESD socket	6	DC power supply captive installation screw
2	DC power supply slot 0 label	7	DC power supply slot 1 label
3	DC power supply switch Standby/On (I) (standby symbol is a broken circle with a vertical line through the top of it)	8	Earth ground lead
4	DC power supply LEDs	9	Positive lead
5	Fan	10	Negative lead

Table 6-7 describes the LEDs on the Cisco ASR 1002 Router DC power supply.

Table 6-7 Cisco ASR 1002 Router DC Power Supply LEDs

LED Label	LED	Color	Description
INPUT OK	A bi-color LED indicates presence of input voltage	Green	LED illuminates green to signal that the DC power supply input voltage is greater than 43.5VDC at turn-on and remains green down to 39VDC.
		Amber	The LED illuminates amber if the power supply turns off due to low input voltage (falls below 39VDC) and indicates that there is still a hazard present (voltage on the terminal block). The LED remains amber and is active to around 20V +/-5V. The LED is not illuminated if the input is below 15V.

LED Label	LED	Color	Description
FAN OK	A bi-color LED indicates power supply fan status	Green	The LED illuminates green when all fans are operational.
		Red	The LED illuminates red when a fan failure is detected.
OUTPUT FAIL	Power supply activity	Red	<p>When the LED is off, it signals that the DC output voltage are within the normal operating range. Output voltage between the minimum and maximum limits will not create an output fail alarm, and output voltages below the minimum or above the maximum will create an Output Fail alarm.</p> <p>Led illuminates red to indicate that the DC output is out of the specified range.</p> <p>When you turn the power supply on, the red LED illuminates for two to three seconds to test LED operation before going off.</p>

This section describes how to connect the DC power supply in a Cisco ASR 1002 Router.



Note

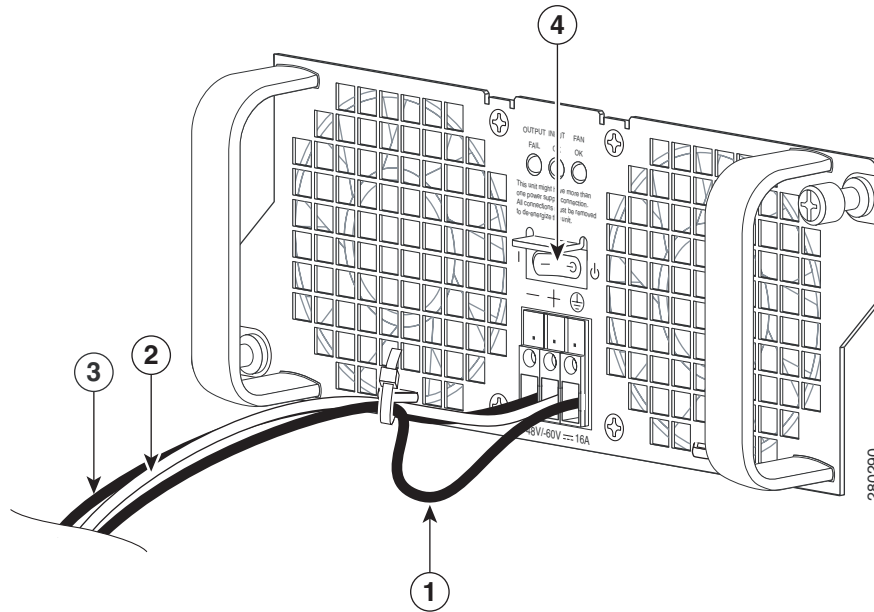
The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.



Warning

When you install the unit, the ground connection must always be made first and disconnected last.
Statement 1046

- Step 1** At the rear of the router, check that the power supply Standby switch is in the Standby (see [Figure 6-25](#)) position.
- Step 2** Ensure that the negative and positive leads are disconnected from the site power source.

Figure 6-25 Cisco ASR 1002 Router DC Power Supply Terminal Block Cable Connections

1	Earth ground lead with service loop and tie-wrap	3	Negative lead
2	Positive lead	4	DC power supply Standby switch

- Step 3** Using a wire stripper, strip approximately 0.55 inch (14 mm) from the negative, positive, and ground lead.
- Step 4** Insert the stripped end of the ground lead all the way into the ground lead receptacle on the DC-input power supply, and tighten the receptacle screw using a 3.5mm flat-blade screwdriver to a torque of 0.5 to 0.6Nm.
- Step 5** Insert the stripped end of the positive lead all the way into the positive lead receptacle and tighten the receptacle screw using the same 3.5mm flat-blade screwdriver. Repeat this step for the negative lead.



Note Make sure the entire stripped end of each lead is inserted all the way into its receptacle. If any exposed wire at the stripped end of a lead is visible after inserting the lead into its receptacle, remove the lead from the receptacle, use the wire stripper to cut the stripped end of the lead, and repeat Step 3 through Step 5.

- Step 6** After tightening the receptacle screw for the ground, positive, and negative DC-input leads, use a cable tie to secure the three leads to the power supply faceplate, as shown in [Figure 6-25](#). When securing the ground, positive, and negative DC-input leads to the power supply faceplate, leave a small service loop in the ground lead to ensure that the ground lead is the last lead to disconnect from the power supply if a great deal of strain is placed on all three leads as shown in [Figure 6-25](#).

**Caution**

Make certain that the earth ground lead wire has a service loop before you tie wrap the lead wires to prevent the ground from being disconnected.

- Step 7** Connect the ground, positive, and negative leads to the power source.
- Step 8** Turn the branch source breaker on.
- Step 9** Place the DC Standby switch in the On (I) position. The power supply LEDs light when power is supplied to the router.

You have completed the procedure for connecting a DC power supply in the Cisco ASR 1002 Router.

Connecting a Terminal to the Cisco ASR1000-RP1 Console Port

The Cisco ASR 1002 embedded router processor has an asynchronous serial (EIA/TIA-232) RJ-45 console port labeled CON on its front panel. You can connect this port to most types of video terminals through use of the console cable kit that is included with your Cisco ASR 1002 Router. The console cable kit contains:

- One RJ-45 to RJ-45 crossover cable
- One RJ-45 to DB-25 (female) adapter
- One RJ-45 to DB-9 (female) adapter

A crossover cable reverses pin connections from one end to the other. In other words, it connects pin 1 (at one end) to pin 8 (at the other end), pin 2 to pin 7, pin 3 to pin 6, and so on. You can identify a crossover cable by comparing the two modular ends of the cable. Hold the cable ends in your hand, side-by-side, with the tabs at the back. Ensure that the wire connected to the outside (left) pin of the left plug (pin 1) is the same color as the wire connected to the outside (right) pin of the right plug (pin 8).

Use the following procedure to connect a video terminal to the console port on a route processor.

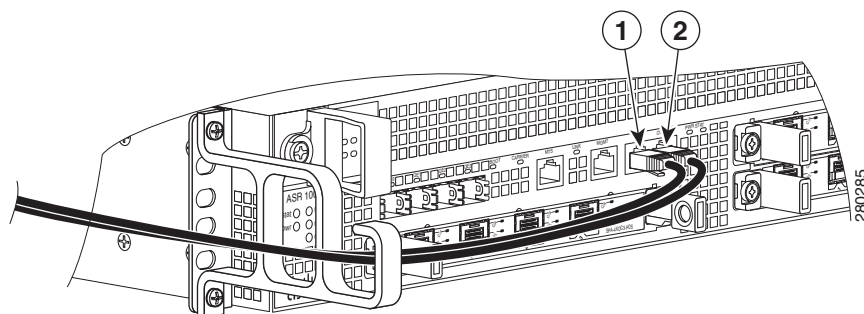


Note

Each Cisco ASR 1000 Series Route Processor 1 must have a console port connection (typically to a terminal server) if you are running a redundant configuration in the chassis.

- Step 1** Connect one end of the RJ-45 cables to the serial RJ-45 port (CON) on the Cisco embedded ASR1000-RP1 (Figure 6-26).

Figure 6-26 Cisco ASR 1002 Router Console Port Connection on Cisco Embedded ASR1000-RP1



1	CON port connection	2	AUX port connection
---	---------------------	---	---------------------

- Step 2** Run the cable up and through the cable-management bracket and connect the other end of the RJ-45 cable to the RJ-45 adapter ([Figure 6-26](#)).
- Step 3** Connect the adapter to your video terminal to complete the cable connection.
- Step 4** Power on your video terminal.
- Step 5** Configure your video terminal to match the following default console port settings:
- 9600 baud
 - 8 data bits
 - No parity generation or checking
 - 1 stop bit
 - No flow control
- Step 6** Go to the [“Connecting Cables” section on page 6-36](#) to continue the installation.
-

Connecting Cables

Keep the following guidelines in mind when connecting external cables to the Cisco ASR 1002 Router:

- To reduce the chance of interference, avoid crossing high-power lines with any interface cables.
- Verify all cabling limitations (particularly distance) before powering on the system.

Auxiliary Connection

This asynchronous EIA/TIA-232 serial port (AUX) is used to connect a modem to the Cisco ASR 1000 Series Route Processor 1 for remote administrative access. Use the following procedure to connect the Cisco ASR 1002 Router to a modem.

-
- Step 1** Connect one end of the modem cable to the RJ-45 port on the primary Cisco ASR 1000 Series Route Processor 1, labeled AUX. For the AUX port connection, see [Figure 6-18](#).
- Step 2** Run the cable up and through the cable-management bracket and connect the other end of the cable to your modem.
-

If you have completed all cable connections, go to, [Chapter 7, “Cisco ASR 1000 Series Routers Power Up and Initial Configuration.”](#)



CHAPTER 7

Cisco ASR 1000 Series Routers Power Up and Initial Configuration

This chapter guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

To configure a Cisco ASR 1000 Series Router from a console, you need to connect a terminal to the router console port.

This chapter contains the following topics:

- [Checking Conditions Prior to System Startup, page 7-1](#)
- [Verifying Power Supply Operation, page 7-2](#)
- [Configuring the Cisco ASR 1000 Series Routers at Startup, page 7-7](#)
- [Power Off the Cisco ASR 1000 Series Router, page 7-10](#)

Checking Conditions Prior to System Startup

Ensure that the following conditions are met before starting up the router:

- The shared port adapter is inserted in its slot.
- The network interface cable is connected.
- The optional Fast Ethernet Management port cable is installed.
- The chassis is securely mounted and grounded.
- The power and interface cables are connected.
- Your PC with terminal emulation program (hyperTerminal or equivalent) is connected to the console port and powered up.
- Your PC terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop bit, no parity, and flow control is set to none.

- You have selected passwords for access control.
- Captive installation screws are tight on all removable components.
- The console terminal is turned on.
- You have determined the IP addresses for the Ethernet and serial interfaces.
- Empty card slots or card bays are filled with card blanks. This ensures proper air flow through the chassis and electromagnetic compatibility (EMC).

You are now ready to start your router.

Verifying Power Supply Operation

Follow this procedure to verify power supply is operating correctly.

Step 1 Check that the power supply LEDs are:

- INPUT OK is green
- FAN OK is green
- OUTPUT FAILED is not illuminated

Step 2 To ensure that the power supply state is OK, type the **show platform** command. This output sample is from a Cisco ASR1006 router. The other Cisco ASR1000 routers display similar type of output.

```
MCP_SCAL_R1#sho plat
Chassis type: ASR1006
```

The following output displays:

Slot	Type	State	Insert Time
1	ASR1000-SIP10	ok	00:03:19
1/1	SPA-8X1GE-V2	ok	00:02:23
2	ASR1000-SIP10	ok	00:03:19
2/0	SPA-1X10GE-L-V2	ok	00:02:22
2/1	SPA-8X1GE-V2	ok	00:02:17
R0	ASR1000-RP1	ok,active	00:03:19
F0	ASR1000-ESP20	ok,active	00:03:19
P0	ASR1006-PWR-AC	ok	00:02:50
P1	ASR1006-PWR-AC	ps, fail	00:02:50

Slot	CPLD Version	Firmware Version
1	07091401	12.2(33r)XN2
2	07091401	12.2(33r)XN2
R0	08060301	12.2(0:0)
F0	08041102	12.2(33r)XN2

```
MCP_SCAL_R1#
```

If the LEDs indicate a power problem or the power supply state is ps,fail, then contact a customer service representatives for assistance or additional instructions.

Powering Up the Cisco ASR 1000 Series Routers

Make certain that all card slots and compartments are closed off. Install blank faceplates on any empty slots. Always have power supply slots filled. If you leave a power supply slot uncovered, then you risk exposure to hazardous voltages on the power pins on the midplane.

After installing your Cisco ASR 1000 Series Routers and connecting cables, start the router.

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

**Note**

There is no cover on the Cisco ASR 1002 router DC power supply terminal block; therefore, Statement 1029 does not apply to the Cisco ASR 1002 router.

You are now ready to power on the system for the first time. Follow these steps.

Step 1

Before you power on, make sure that:

- a. The AC cord is plugged into the AC power inlet.
- b. All cables are connected.
- c. Your computer is powered up and connected.

**Note**

To view the boot sequence, you must have a console connection to the Cisco ASR 1000 Series Routers before it powers up.

Step 2

Move the power switch to the ON position. Listen for the fans; you should immediately hear them operating.

Step 3

Depending on your installation, some LEDs on the rear of the chassis and on installed modules also come on.

**Caution**

Do not press any keys on the keyboard until the messages stop and the SYS PWR LED is solid green. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the router to power off and start over. It takes a few minutes for the messages to stop.

**Note**

This is only an example of what can display. The system boots differently depending upon the configuration that ships with your system.

Step 4

Observe the initialization process. When the system boot is complete (a few seconds), the Cisco ASR 1000 RP1 begins to initialize.

Example 7-1 Loading the Default System Boot Image

```
rommon 1 >
```

```

rommon 1 > boot
Located rp_super.ppc.nader.5g.evfc.bin
Image size 211681484 inode num 12, bks cnt 51681 blk size 8*512
#####
#####
#####
#####
#####
#####
#####
Boot image size = 211681484 (0xc9e00cc) bytes

Using midplane macaddr
Package header rev 0 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
    calculated 479a7d62:6c128ba8:3616b8da:93cb3224:5c1aeb34
    expected   479a7d62:6c128ba8:3616b8da:93cb3224:5c1aeb34
Image validated

PPC/IOS XE loader version: 0.0.3
loaded at:      00800000 0D1E2004
zimage at:      00807673 009B8C69
initrd at:      009B9000 01006219
isord at:       01007000 0D1DF800
avail ram:      00400000 00800000

Kernel load:
Uncompressing image... dst: 00000000 lim: 00400000 start: 00807673 size: 001B15F6...done.
Now booting the IOS XE kernel

```

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cisco ASR1002 (RP1) processor with 541737K/6147K bytes of memory.

4 Gigabit Ethernet interfaces

32768K bytes of non-volatile configuration memory.

1869396K bytes of physical memory.

7798783K bytes of eUSB flash at bootflash:.

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

*Feb 19 17:34:27.361: % Error opening nvram:/ifIndex-table No such file or directory

*Feb 19 17:34:28.235: %ASR1000_MGMTVRF-6-CREATE_SUCCESS_INFO: Management vrf Mgmt-intf created with ID 4085, ipv4 table-id 0xFF5, ipv6 table-id 0x1E000001

*Feb 19 17:34:29.720: %PARSER-4-BADCFG: Unexpected end of configuration file.

*Feb 19 17:34:29.809: %NETCLK-5-NETCLK_MODE_CHANGE: Network clock source not available. The network clock has changed to freerun

*Feb 19 17:34:10.138: %CPPHA-7-SYSREADY: F0: cpp_ha: CPP client process FMAN-FP (5 of 5) ready.

*Feb 19 17:34:29.824: %LINK-3-UPDOWN: Interface GigabitEthernet0, changed state to up

```

*Feb 19 17:34:10.269: %IOSXE-6-PLATFORM: F0: cpp_cp:  cpp_mlp_svr_client_bind:
cpp_mlp_svr_ifm_init() successful
*Feb 19 17:34:10.362: %CPPHA-7-START: F0: cpp_ha:  CPP 0 preparing image
/usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:10.473: %CPPHA-7-START: F0: cpp_ha:  CPP 0 startup init image
/usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:14.688: %CPPHA-7-START: F0: cpp_ha:  CPP 0 running init image
/usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:14.919: %CPPHA-7-READY: F0: cpp_ha:  CPP 0 loading and initialization
complete
*Feb 19 17:34:14.919: %CPPHA-6-SYSINIT: F0: cpp_ha:  CPP HA system configuration start.
*Feb 19 17:34:15.179: %IOSXE-6-PLATFORM: F0: cpp_cp:  Process
CPP_FILTER_EA_EVENT__API_CALL__REGISTER
*Feb 19 17:34:15.286: %CPPHA-6-SYSINIT: F0: cpp_ha:  CPP HA system enabled.
*Feb 19 17:34:15.287: %CPPHA-6-SYSINIT: F0: cpp_ha:  CPP HA system initializaton
complete.
*Feb 19 17:34:30.823: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0,
changed state to down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to
administratively down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to
administratively down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/2, changed state to
administratively down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/3, changed state to
administratively down
*Feb 19 17:35:13.865: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0/0, changed state to down
*Feb 19 17:35:13.865: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0/1, changed state to down
*Feb 19 17:35:13.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0/2, changed state to down
*Feb 19 17:35:13.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0/3, changed state to down
*Feb 19 17:35:19.167: %ASR1000_OIR-6-REMSPA: SPA removed from subslot 0/0, interfaces
disabled
*Feb 19 17:35:19.171: %ASR1000_OIR-6-INSCARD: Card (fp) inserted in slot F0
*Feb 19 17:35:19.171: %ASR1000_OIR-6-ONLINECARD: Card (fp) online in slot F0
*Feb 19 17:35:19.187: %ASR1000_OIR-6-INSCARD: Card (cc) inserted in slot 0
*Feb 19 17:35:19.187: %ASR1000_OIR-6-ONLINECARD: Card (cc) online in slot 0
*Feb 19 17:35:19.189: %ASR1000_OIR-6-INSSPA: SPA inserted in subslot 0/0
*Feb 19 17:35:19.452: %SYS-5-RESTART: System restarted --
Cisco IOS Software, IOS-XE Software (PPC_LINUX_IOSD-ADVENTERPRISEK9-M), Version
12.2(33)XNA, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
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Cisco IOS-XE software, Copyright (c) 1986-2008 by Cisco Systems, Inc.*Feb 19
17:35:19.455: %SYS-6-BOOTTIME: Time taken to reboot after reload = 78809 seconds
*Feb 19 17:35:19.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Feb 19 17:35:19.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF

```

```
*Feb 19 17:35:21.669: %DYNCMD-7-CMDSET_LOADED: The Dynamic Command set has been loaded
from the Shell Manager
```

```
*Feb 19 17:35:22.221: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
```

```
Router>
```

- Step 5** During the boot process, observe the system LEDs. The LEDs on the shared port adapter go on and off in irregular sequence. They may go on, go out, and go on again for a short time. On the router, the green STATUS LED comes on and stays on.
-

Verifying the Front Panel LEDs

The front-panel indicator LEDs provide power, activity, and status information useful during bootup. For more detailed information about the LEDs, refer to [Chapter 2, “Cisco ASR 1000 Series Routers Components.”](#)

Verifying the Hardware Configuration

To display and verify the hardware features, enter the following commands:

- **show version**—Displays the system hardware version; the installed software version; the names and sources of configuration files; the boot images; and the amount of installed DRAM, NVRAM, and flash memory.
- **show diag slot**—Displays the IDPROM information for the assemblies in the chassis.

Checking Hardware and Software Compatibility

To check the minimum software requirements of the Cisco IOS software with the hardware installed on your Cisco ASR 1000 Series Routers, Cisco maintains the Software Advisor tool on Cisco.com. This tool does not verify whether Cisco ASR 1000 Series SIPs or SPAs within a system are compatible; but the tool provides the minimum Cisco IOS requirements for individual hardware modules and components.



Note

To access this tool, you must have a Cisco.com login account.

To access the Software Advisor, click **Login** at Cisco.com, type **Software Advisor** in the search box, and click **Go**. Click the link for the Software Advisor Tool.

Choose a product family or enter a specific product number to search for the minimum supported software needed for your hardware.

Configuring the Cisco ASR 1000 Series Routers at Startup

This section explains how to create a basic running configuration for your Cisco ASR 1000 Series Routers.

**Note**

You need to acquire the correct network addresses from your system administrator or consult your network plan to determine correct addresses before you can complete the router configuration.

Before continuing the configuration process, check the current state of the router by entering the **show version** command. The **show version** command displays the release of Cisco IOS software that is available on the router.

For information on modifying the configuration after you create it, see the Cisco IOS configuration and command reference guides.

To configure a Cisco ASR 1000 Series Routers from the console, you must connect a terminal or terminal server to the console port on the Cisco ASR 1000 Series RP1. To configure the Cisco ASR 1000 Series Routers over your management Ethernet, you must have the router's IP address available.

Using the Console Interface

To access the command line interface using the console, follow these steps:

-
- Step 1** Your system is booting and if you answer No, at the prompt:
- ```
--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no
```
- Step 2** Then Press **Return** to enter user EXEC mode. The following prompt appears:
- ```
Router>
```
- Step 3** From user EXEC mode, enter the enable command as shown in the following example:
- ```
Router> enable
```
- Step 4** At the password prompt, enter your system password. If an enable password has not been set on your system, this step may be skipped. The following example shows entry of the password called *enablepass*:
- ```
Password: enablepass
```
- Step 5** When your enable password is accepted, the privileged EXEC mode prompt appears: Router#
- Step 6** You now have access to the CLI in privileged EXEC mode and you can enter the necessary commands to complete your desired tasks. To exit the console session, enter the quit command as shown in the following example:
- ```
Router# quit
```
- 

## Configuring Global Parameters

When you first start the setup program, you must configure the global parameters. These parameters are used for controlling system-wide settings. Complete the following steps to enter the global parameters:

- 
- Step 1** Connect a console terminal to the console port, and then boot the router.





**Note** This is only an example of the output display; prompts may vary.

When you see this information, you have successfully booted your router:

```
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 cisco Systems, Inc.
 170 West Tasman Drive
 San Jose, California 95134-1706
.
.
.

 --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: yes

Press RETURN to get started!
```

**Step 2** The first sections of the configuration script appear only at an initial system startup. On subsequent uses of the setup facility, the script begins with a System Configuration Dialog as shown below: When asked if you would like to enter the initial configuration dialog, enter **yes**.

```
Would you like to enter the initial configuration dialog? [yes/no] yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity for management of the
system, extended setup will ask you to configure each interface on the system.
```



**Note** Basic management setup configures enough connectivity for managing the system; extended setup will ask you to configure each interface on the system. For detailed information about setting global parameters, refer to the *Cisco ASR 1000\_Series Aggregation Services Routers Software Configuration Guide*.

## Checking the Running Configuration Settings

To check the value of the settings you have entered, enter the **show running-config** command at the Router# prompt:

```
Router# show running-config
```

To review changes you make to the configuration, use the EXEC mode **show startup-config** command to see the changes and copy run-start stored in NVRAM.

## Saving the Running Configuration to NVRAM

To store the configuration or changes to your startup configuration in NVRAM, enter the copy running-config startup-config command at the Router# prompt:

```
Router# copy running-config startup-config
```

Using this command saves the configuration settings that you created in the router using configuration mode and the setup facility. If you fail to do this, your configuration will be lost the next time you reload the router.

## Power Off the Cisco ASR 1000 Series Router

This section explains how to shut down the Cisco ASR 1000 Series router. It is recommended that before turning off all power to the chassis, you issue the **reload** command. This insures that the operating system cleans up all the file systems. Once the reload operation is complete, then the Cisco ASR 1000 Series router can be powered off safely.

To remove power from the Cisco ASR 1000 Series Router, follow this procedure:

- 
- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 2** Before you shutdown a power supply, issue the IOS **reload** command to halt the system and then wait for ROM Monitor to execute before proceeding to the next step. The following screen shot shows an example of the reload command:

```
Router#reload
Proceed with reload? [confirm]

*Jun 18 19:38:21.870: %SYS-5-RELOAD: Reload requested by console. Reload Reason:
Reload command.
```

- Step 3** Remove any power cables from the Cisco ASR 1000 Series Router.
- a. For power supplies with a circuit breaker switch, position the switch to the Off (O) position.
  - b. For power supplies with a Standby switch, place the Standby switch in the Standby position.



### Note

After powering off the router, wait a minimum of 30 seconds before powering it on again.

---



## CHAPTER 8

# Replacing Cisco ASR 1000 Series Routers Field-Replaceable Units

---

This chapter provides information on removing and replacing field-replaceable units (FRUs). The following information is in this chapter:

- [Removing and Replacing the Cisco ASR 1000 Series RP1, page 8-1](#)
- [Removing and Replacing the Cisco ASR 1000 Series RP1 Internal Hard Drive, page 8-3](#)
- [Removing and Replacing the Cisco ASR 1000 Series RP1 DIMM Memory Module, page 8-9](#)
- [Removing and Replacing an eUSB Device, page 8-13](#)
- [Removing and Replacing the 1GB USB Flash Token Memory Stick, page 8-15](#)
- [Removing and Replacing the Cisco ASR 1000 Series Embedded Service Processors, page 8-17](#)
- [Removing and Replacing a SPA Interface Processor, page 8-19](#)
- [Removing and Replacing a Cisco ASR 1006 Router Power Supply, page 8-22](#)
- [Removing and Replacing a Cisco ASR 1004 Router Power Supply, page 8-31](#)
- [Removing and Replacing a Cisco ASR 1002 Router Power Supply, page 8-40](#)
- [Repacking the Box, page 8-48](#)

## Removing and Replacing the Cisco ASR 1000 Series RP1

The following sections describe the procedures for removing and replacing a Cisco ASR 1000 Series RP1 route processor in your Cisco ASR 1006 Router and Cisco ASR 1004 Router (The Cisco ASR1000-RP1 in the Cisco ASR 1002 Router is not a field-replaceable unit because it is embedded into the chassis).



**Warning**

---

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

---



**Warning**

---

**During this procedure, wear grounding wrist straps to avoid ESD damage to any card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

---

**Note**

If you have two Cisco ASR 1000 Series RP1s in the Cisco ASR 1000 Series Router and you want to remove one, do not power down the router. Remove the route processor and insert a new one, because high availability provides for the other Route Processor to take on the processing tasks for the router.

## Removing the Cisco ASR1000-RP1

To remove the Cisco ASR 1000 Series RP1 from the Cisco ASR 1000 Series Router, follow this procedure:

- 
- Step 1** Slip on an ESD-preventive wrist strap and attach it to a chassis surface.
  - Step 2** If connected, remove any I/O cables from the Cisco ASR 1000 Series RP1.
  - Step 3** Using a number 2 Phillips or a 3/16-inch flat-blade screwdriver, loosen the two captive screws on the faceplate of the Cisco ASR1000-RP1.
  - Step 4** Using the handles on both sides of the module, with two hands gently slide the module out of the chassis slot.

**Caution**

Handle the Cisco ASR 1000 Series RP1 by the carrier edges only; never touch the printed circuit board components or connector pins.

- 
- Step 5** Place the Cisco ASR 1000 Series RP1 module on an antistatic surface with its printed circuit board components facing upward or in a static shielding bag.

**Note**

If you are returning the Cisco ASR1000 RP1 to the factory, immediately place it in a static shielding bag.

---

This completes the procedure for removing an installed Cisco ASR 1000 Series RP1 module from the Cisco ASR 1006 Router and Cisco ASR 1004 Router.

## Replacing the Cisco ASR1000-RP1

To replace the Cisco ASR 1000 Series RP1 in the Cisco ASR 1000 Series Router, follow this procedure:

- 
- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
  - Step 2** Remove the new Cisco ASR1000-RP1 from its static shielding bag.
  - Step 3** Using both hands, grasp the Cisco ASR1000-RP1 by its metal carrier edges and orient the it so that its printed circuit board components are upward.

**Caution**

Handle the Cisco ASR1000-RP1 by the carrier edges and handle only; never touch the printed circuit board components or connector pins.

- Step 4** Align the left and right edges of the Cisco ASR1000-RP1 printed circuit board between the Cisco ASR1000-RP1 slot guides.
- Step 5** Gently slide the Cisco ASR1000-RP1 all the way into its chassis slot until you feel the connectors seat with the router midplane.
- Step 6** Seat the Cisco ASR1000-RP1 in the router midplane by tightening its captive installation screws with a number 2 Phillips or a 3/16-inch flat-blade screwdriver.
- 

This completes the procedure for replacing the Cisco ASR1000-RP1 in a Cisco ASR1000 Series Router.

## Removing and Replacing the Cisco ASR 1000 Series RP1 Internal Hard Drive

The Cisco ASR 1000 Series RP1 contains an internal hard drive disk that provides nonvolatile storage in the form of an internal flash disk. The Cisco ASR 1000 Series RP1 module can be configured with either a 40 GB or a 32 GB disk. Both components are field-replaceable on the Cisco ASR 1006 Router and the Cisco ASR 1004 Router (there is no hard disk in the Cisco ASR 1002 Router). On the front panel of the Cisco ASR 1000 Series RP1, the DISK HD LED indicates activity on the hard drive.

This section explains how to remove a hard drive assembly from the Cisco ASR 1000 Series RP1 module and replace it with a new internal hard drive.

### Cisco ASR 1000 Series RP1 Spare Hard Drive Accessory Kit

The Cisco ASR 1000 Series RP1 spare hard drive ships with an accessory kit. Verify that the following items have been shipped in the accessory kit before you remove and replace a damaged Cisco ASR 1000 Series RP1 module internal hard drive:

- Hard drive assembly
- Two cables and tie wrap
- One EMI wrist strap
- Document: *Removing and Replacing the Cisco ASR 1000 Series RP1 FRU*

Follow these procedures to remove and then replace the Cisco ASR 1000 Series RP1 internal hard drive in a Cisco ASR 1000 Series Router.



#### Warning

**During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

---

Before you begin, read the following important notices:

- The reason you would be removing an internal hard drive is that it is failing or failed; so any data recovery may be lost.

If the drive is functioning, you can back it up to a drive plugged into a USB port using the **archive tar** command. At the router# prompt, type:

```
archive tar / create tarfile_dir_name file(s)_to_be_tarred
```

Example:

```
archive tar usb0: test_files harddisk: * This would theoretically copy the whole
harddisk to the device on usb0: under a tar file named test_files
```

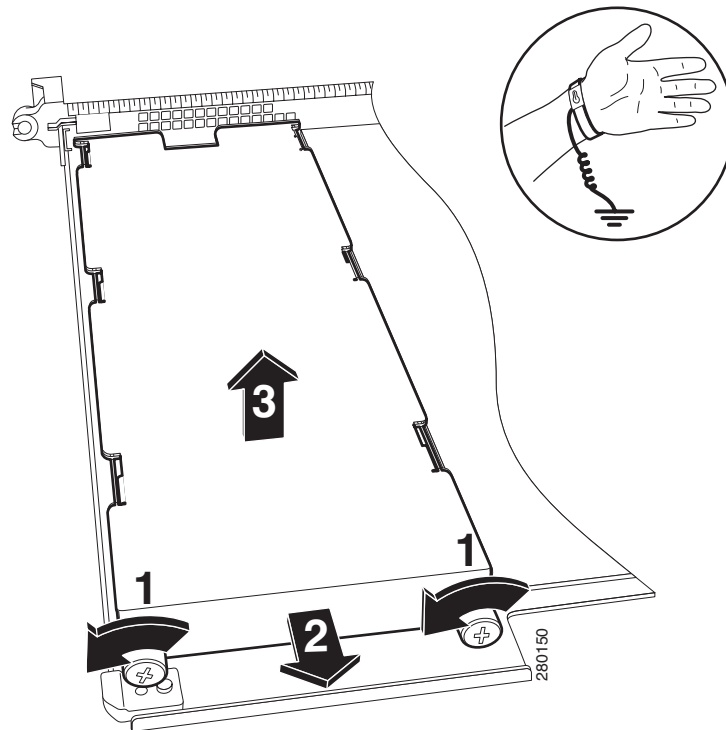
- The new internal hard drive will be automatically partitioned and formatted when the system boots up, if it is not correct, which means the drive was not previously formatted or was formatted in a different manner than the Cisco ASR1000 requirements.

## Removing the Cisco ASR 1000 Series RP1 and Internal Hard Drive from the Cisco ASR 1000 Series Router

To remove the Cisco ASR 1000 Series Route Processor board from the Cisco ASR 1000 Series Router, follow this procedure:

- 
- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit. Loosen the screw fasteners on the Cisco ASR 1000 Series RP1 module.
- Step 2** Perform an OIR shutdown on the Cisco ASR1000-RP1. At the router# prompt, type:  
**hw-module slot R (0 or 1) stop.**

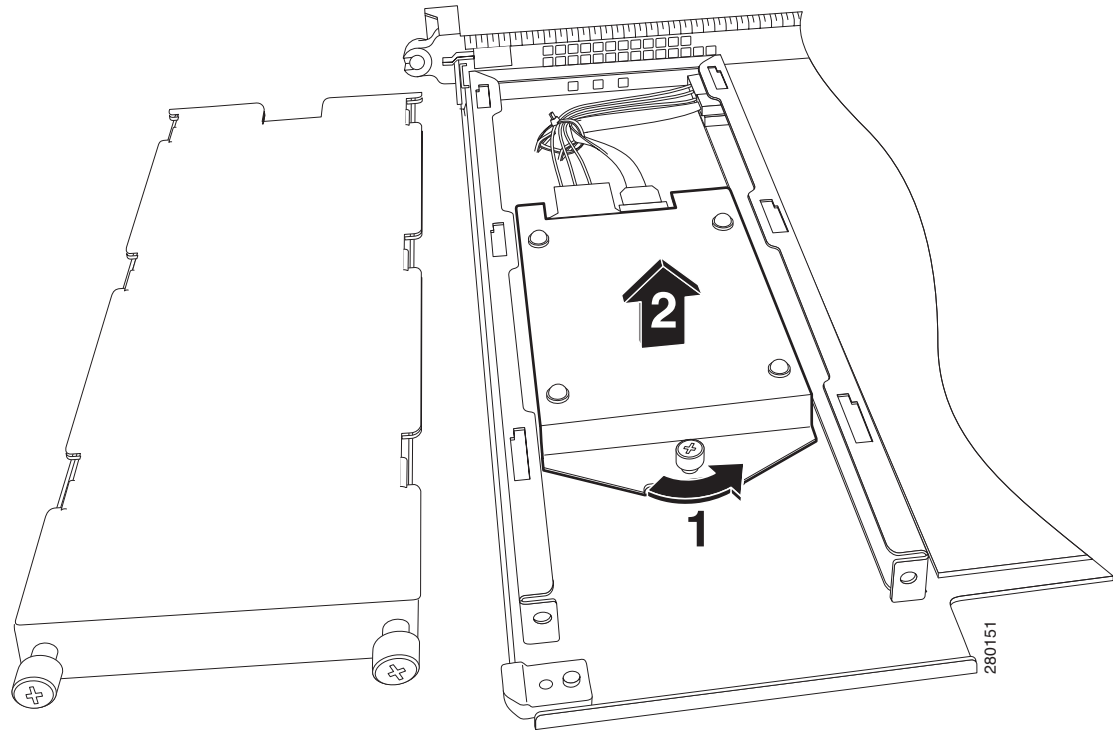
**Figure 8-1** Cisco ASR 1000 Series Route Processor1 Internal Hard Drive Unit



- Step 3** Using the handles on both sides of the module, with two hands gently slide the Cisco ASR 1000 Series RP1 out of the chassis.
- Step 4** Place the module on a flat surface free of dust and dirt.
- Step 5** Remove the internal hard drive cover:
- Unscrew the fasteners.
  - Slide the cover off.
  - Lift the cover up from the board.

Figure 8-2 displays the Cisco ASR 1000 Series RP1 module with the hard drive cover removed.

**Figure 8-2 Cisco ASR 1000 Series RP1 Module Hard Drive Cover and Screw Fastener**



**Step 6** Using a # 2 Phillips screwdriver or a flat head screwdriver, loosen the screw fasteners and remove the cover as shown in Figure 8-2.

**Step 7** On the hard drive, unscrew the captive screw fastener.



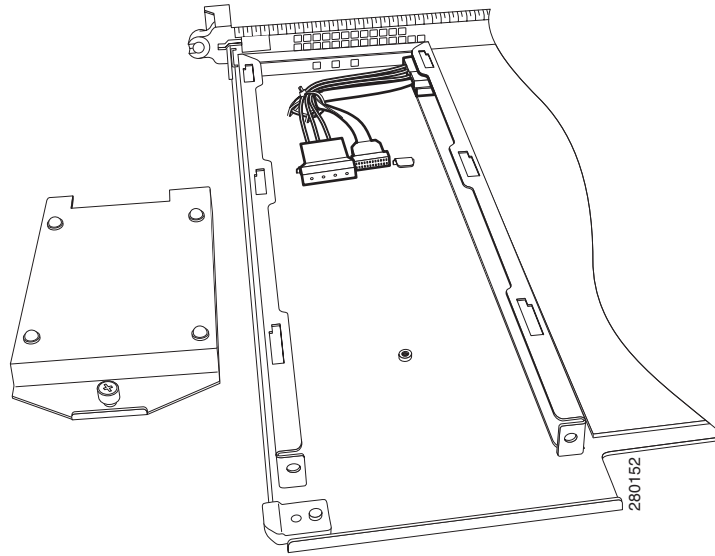
**Note** **Inspect the existing cables and replace them only if they are damaged.** If you do not need to replace them, leave the connection to the Cisco ASR 1000 Series Route Processor 1 in place and only remove the connection to the internal hard drive.

**Step 8** Carefully disconnect the cables at the rear of the hard drive. These cables are tie-wrapped in to prevent them from disconnecting from the Cisco ASR 1000 Series RP1 itself. If the cables are not damaged, leave the cables connected to the Cisco ASR 1000 Series Route Processor 1 with the tie wrap in place. Remove the old hard drive.



Figure 8-3 shows the cables still connected because they do not have to be replaced.

**Figure 8-3** Cisco ASR 1000 Series RP1 Module With Internal Hard Drive Removed

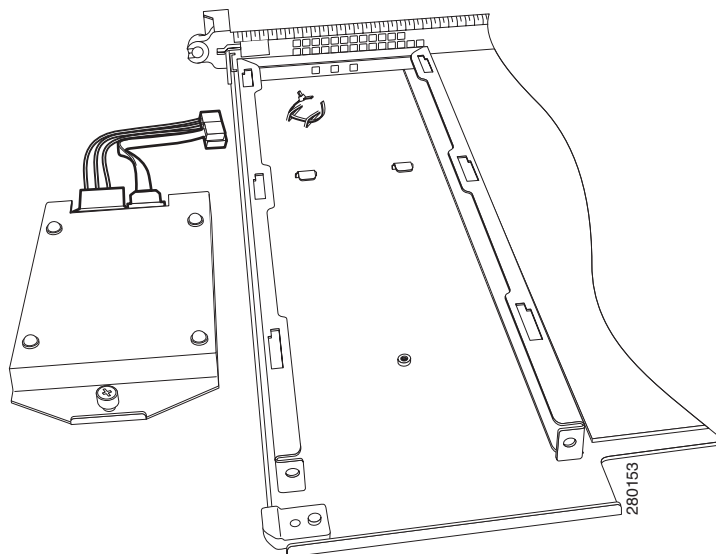


**Step 9** If the cables are damaged:

- a. Remove the tie wrap around the cables.
- b. Disconnect the cables from both the Cisco ASR 1000 Series Route Processor 1 connector and the internal hard drive connector as shown in Figure 8-4.

Figure 8-4 shows the hard drive and cables removed in order to be replaced.

**Figure 8-4** Cisco ASR 1000 Series RP1 Internal Hard Drive and Module Base



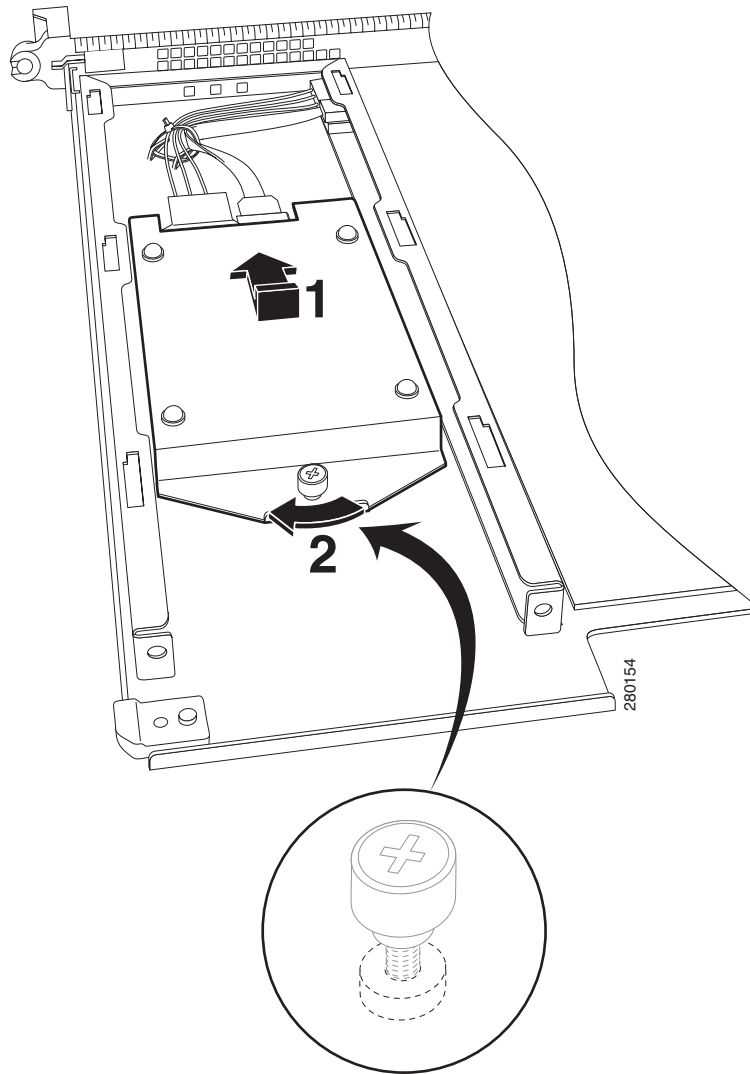
This completes the procedure for disconnecting the Cisco ASR 1000 Series RP1 internal hard drive.

## Replacing the Cisco ASR 1000 Series RP1 Internal Hard Drive

To replace the Cisco ASR 1000 Series RP1 internal hard drive and insert the Cisco ASR 1000 Series Route Processor 1 into the Cisco ASR 1000 Series Router, follow these steps:

- Step 1** On the Cisco ASR 1000 Series RP1, carefully align the new hard drive unit with its screw fastener to the base screw on the bottom of the module.
- Step 2** Reconnect the two cables to the rear of the hard drive. These are keyed for easy connection.

**Figure 8-5** Cisco ASR 1000 Series RP1 Internal Hard Drive and Module Base



|          |                            |          |                         |
|----------|----------------------------|----------|-------------------------|
| <b>1</b> | Hard drive module fastener | <b>2</b> | Carrier mating fastener |
|----------|----------------------------|----------|-------------------------|

- Step 3** Align hard drive module to carrier base tabs, align the module fastener to base screw mate by hand, and then tighten with screw driver.
- Step 4** Replace the cover by aligning the tabs in the slot and tightening the screw fasteners.
- Step 5** With two hands, grab the handles on the Cisco ASR 1000 Series RP1 module and slide it back into its slot in the Cisco ASR 1000 Series Router and tighten the captive screw.
- 

You have completed the replacement procedure for the Cisco ASR 1000 Series Route Processor 1 internal hard drive.

## Removing and Replacing the Cisco ASR 1000 Series RP1 DIMM Memory Module

The Cisco ASR 1000 Series RP1 memory interface supports two DDR-II SDRAM MiniDIMMs with ECC protection.'

**Note**

Unlike the Cisco ASR 1006 and ASR 1004, the DIMM memory interface is not field-replaceable on the Cisco ASR 1002 router.

'This section provides instructions for upgrading or replacing the Cisco ASR 1000 Series RP1 MiniDIMM memory modules.

**Note**

The Cisco ASR 1000 Series RP1 memory spares are sold as pairs. For example, the 2GB memory spare (M-ASR1K-RP1-2GB=) is sold as a pair of 1GB modules and the 4GB memory spare (M-ASR1K-RP1-4GB=) is sold as a pair of 2GB modules. Memory repairs or upgrades must utilize the complete memory pairs as shipped from Cisco. For example, if 1 of the 2 memory modules were to fail on the Cisco ASR 1000 RP1, then both memory modules must be removed and replaced with a spare memory pair (as shipped from Cisco) and the failing memory should be returned as a pair to Cisco.

To prevent the system from operating incorrectly, do not mix modules from different vendors. The modules might not be compatible with each other.

**Warning**

**During these procedures, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

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Things you should know before you begin:

- Use an ESD-preventative wrist strap
- Back up any data that you want to save before replacing an eUSB device
- The card is keyed and slotted for easier connection
- Never wiggle the DIMM
- Handle the connector according to the instructions (see [Figure 8-9](#)).

To replace or upgrade the Cisco ASR 1000 Series DIMM memory spare, follow these steps:

**Step 1** Attach an ESD-preventative wrist strap between you and an unpainted router surface.

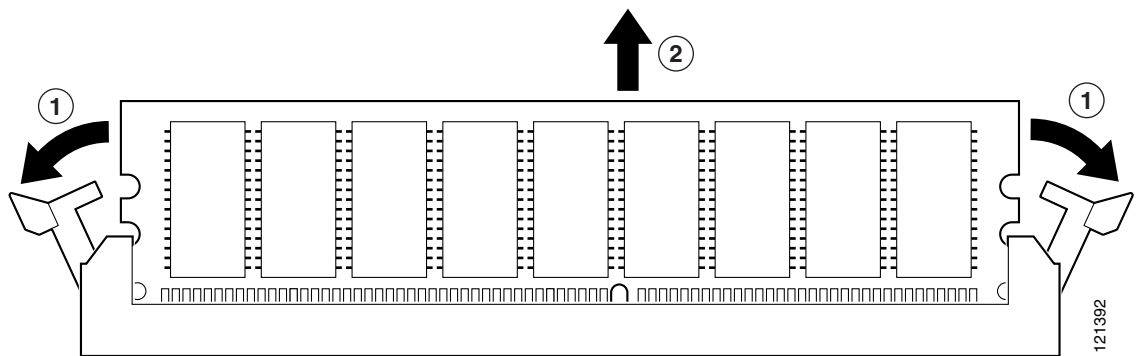
**Step 2** Locate the DIMM on the system board.



**Note** The DIMMs shown in Figures 8-6 and 8-7 are representative and might not look exactly like the DIMMs used on the RP; but the procedure is the same.

**Step 3** Press both spring latches outward to release the DIMM.

**Figure 8-6** Cisco ASR 1000 Series RP1 DIMM Module Spring Latches



- |          |                            |          |                |
|----------|----------------------------|----------|----------------|
| <b>1</b> | Pull spring clips outward. | <b>2</b> | Pull DIMM out. |
|----------|----------------------------|----------|----------------|

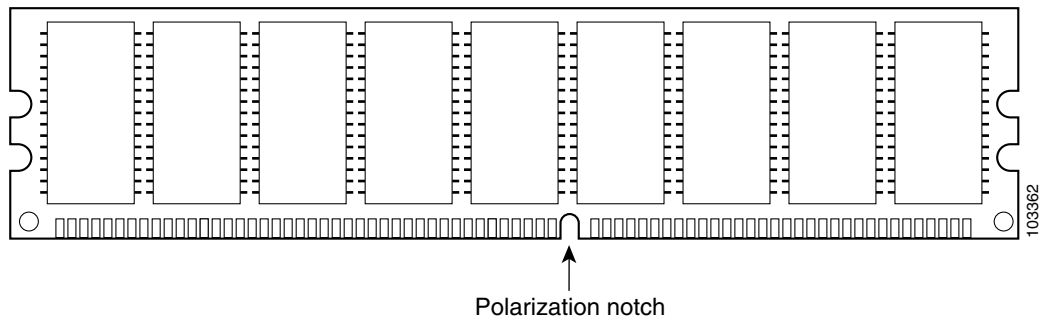
**Step 4** Pull the latches away from the DIMM on both edges. This lifts the DIMM slightly. Gently lift the DIMM free from the DIMM connector, taking care not to touch the pins that insert into the socket.

**Step 5** Place the DIMM in an anti-static bag to protect the DIMM from ESD damage.

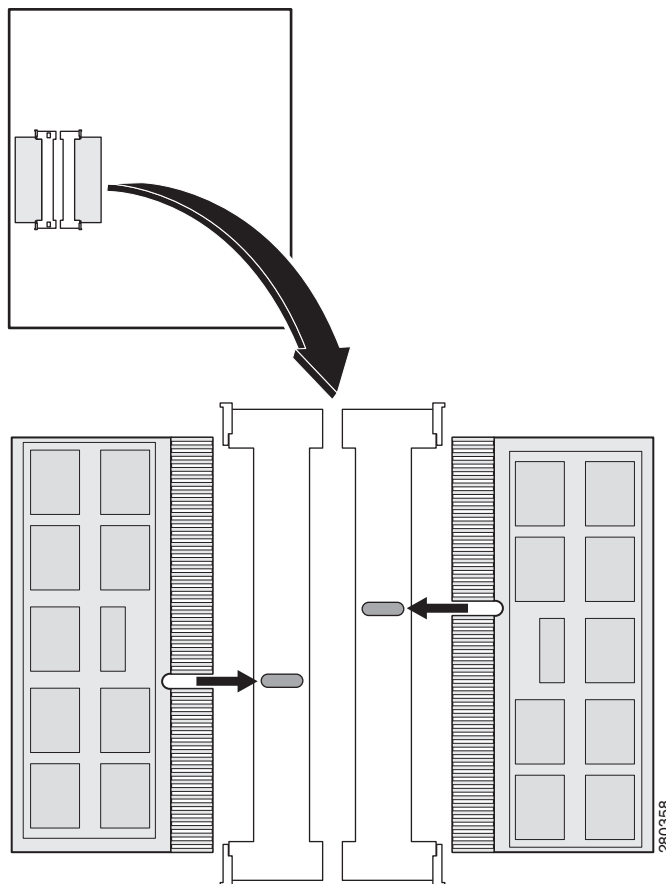


**Caution**

Forcing the DIMM into the socket can damage the DIMM. Use the notches on the DIMM to align the DIMM in the DIMM socket before inserting it (see [Figure 8-7](#)).

**Figure 8-7** Cisco ASR 1000 Series RP1 DIMM Module Notch Location

**Step 6** To install the DIMM memory card, locate the notches and align the DIMM with the socket before inserting it.

**Figure 8-8** Cisco ASR 1000 Series RP1 DIMM Module Alignment

**Note** Hold the DIMM with two hands at its edge and insert the card.

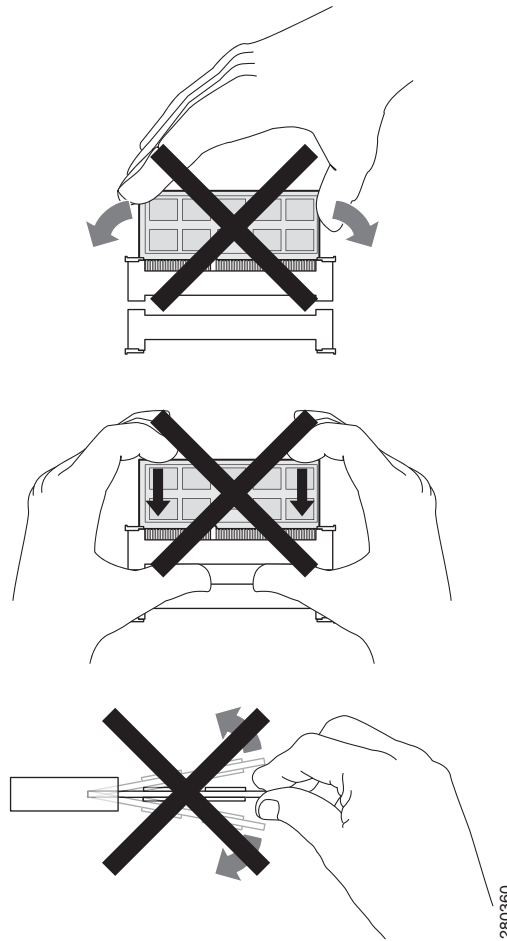
**Step 7** Make certain that both latches on the DIMM connector are open.

- Step 8** Gently insert the new DIMM, taking care not to damage the pins on the edge of the DIMM.
- Step 9** Carefully and firmly press the DIMM into the connector until the spring latches lock the DIMM in place. See [Figure 8-6](#).

**Caution**

Strong insertion force introduces excessive mechanical stress on the DIMM. To prevent any stress on the soldering joints, there should be **no** up, down, or wiggling motion to be done on the DIMM during the insertion as shown in [Figure 8-9](#).

**Figure 8-9** Handling Cisco ASR 1000 Series RP1 DIMM Module



- Step 10** Slide the DIMM one side at a time. Use light insertion force and insert smoothly; but make certain the DIMM is inserted *straight*.

**Note**

Make sure you perform steps 3 thru 11 for both DIMMs on the RP 1 before you replace the RP1 in the system. Replace the Cisco ASR1000-RP1. All DIMMS must be replaced; not just one on the RP1

This completes the procedure for replacing a DIMM memory module on the Cisco ASR 1000 Series RP1.

## Removing and Replacing an eUSB Device

The Cisco ASR 1000 Series RP1 comes with an embedded eUSB (Embedded USB memory) flash device that functions as the route processor NVRAM and BootDisk. The Cisco ASR 1000 Series Route Processor 1 supports a 1GB eUSB flash field-replaceable unit on the Cisco ASR 1006 and Cisco ASR 1004 router.

**Note**

The 8 GB eUSB on the built-in route processor is not a field-replaceable unit (FRU) on the Cisco ASR 1002 Router.

Before you physically replace the eUSB device, follow this procedure on the Cisco ASR1000-RP1.

**Step 1**

Make a backup of startup-config and prepare the router:

**Step 2**

To remove the Cisco ASR1000-RP and eUSB device from the chassis, follow these steps:

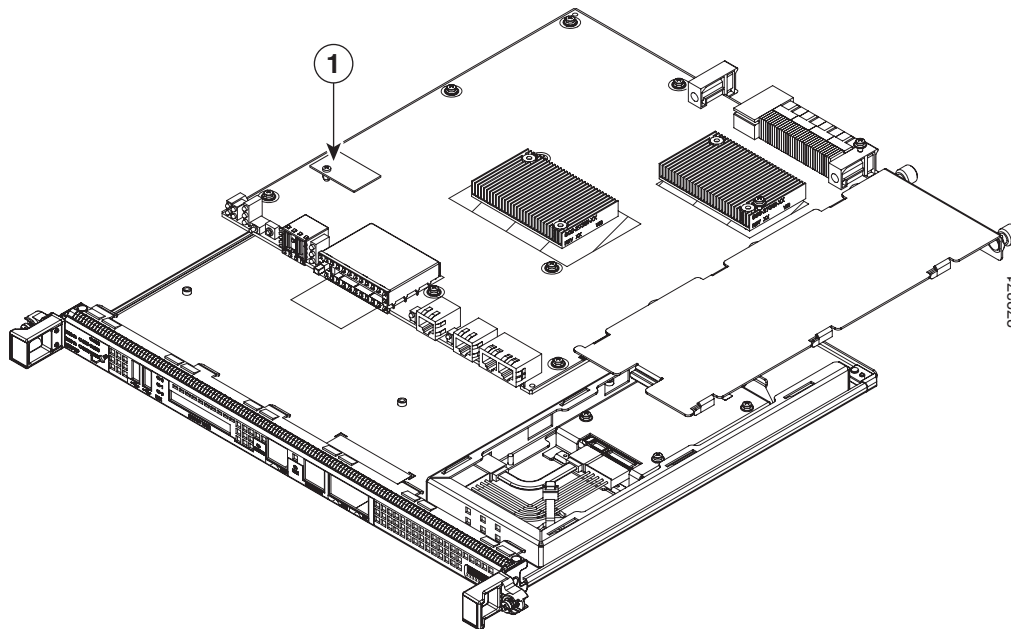
- a. Attach an ESD-preventative wrist strap between you and an unpainted router surface.
- b. If connected, remove any I/O cables from the Cisco ASR 1000 Series RP1.
- c. Using a number 2 Phillips or a 3/16-inch flat-blade screwdriver, loosen the two captive screws on the faceplate of the Cisco ASR1000-RP1.
- d. Using the handles on both sides of the module, with two hands gently slide the module out of the chassis slot.

**Caution**

Handle the Cisco ASR 1000 Series RP1 by the carrier edges only; never touch the printed circuit board components or connector pins.

- e. Place the Cisco ASR 1000 Series RP1 module on an antistatic surface with its printed circuit board components facing upward.
- f. Locate the eUSB device on the ASR100-RP1 board. [Figure 8-10](#) shows the location orientation of the eUSB device on the Cisco ASR1000-RP1 board.

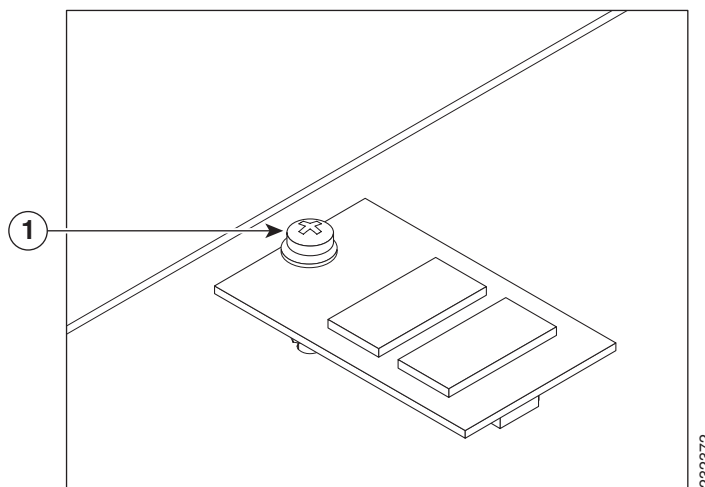
**Figure 8-10** Cisco ASR1000-RP1 eUSB Location



**1** Cisco ASR1000-RP1 eUSB device location

- g. Remove the small Phillips screw holding the eUSB board in-place.

**Figure 8-11** Cisco ASR1000-RP1 eUSB Device



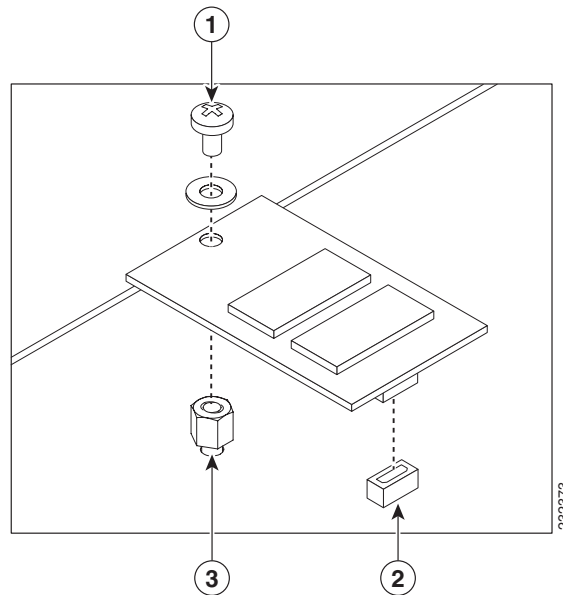
**1** Cisco ASR1000-RP1 eUSB device Phillips screw

- h. Gently pull the eUSB device up from its connector and remove it.
- i. Place the eUSB device in an anti-static bag.



- j. Align the replacement eUSB device over the connector and standoff. The device fits over the threaded post that sticks up off the board and accepts a screw to hold the eUSB firmly to the Cisco ASR 1000 RP1 board.
- k. Gently insert the new eUSB device by pressing it into the connector keeping aligned with the standoff and secure the eUSB device with the small Phillips screw as displayed in [Figure 8-12](#).

**Figure 8-12 Cisco ASR1000-RP1 eUSB Device Removal and Replacement**



|          |                |          |          |
|----------|----------------|----------|----------|
| <b>1</b> | Phillips screw | <b>3</b> | Standoff |
| <b>2</b> | eUSB connector |          |          |

**Step 3** Replace the Cisco ADR1000-RP into chassis.

**Step 4** Restore files to bootflash and startup-config

This completes the removal and replacement of the eUSB flash device on a Cisco ASR1000-RP1.

## Removing and Replacing the 1GB USB Flash Token Memory Stick

The Cisco ASR 1000 Series Route Processor 1 contains ports for a 1GB flash token memory stick to store configurations or Cisco IOS XE consolidated packages.

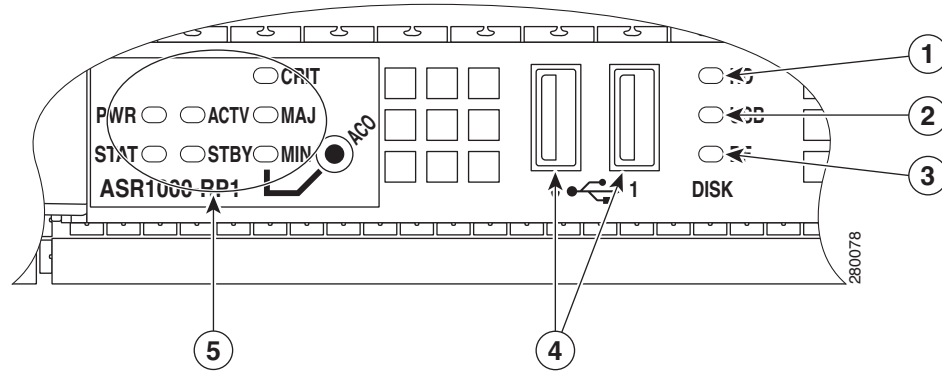


**Note**

Only Cisco USB Flash memory modules are supported by Cisco routers.

Figure 8-13 shows the USB port 0 or 1 connector (callout 4) on the Cisco ASR 1000 Series Route Processor 1 for the 1GB flash token memory stick.

**Figure 8-13 Cisco ASR 1000 Series Route Processor 1 Token Memory Stick Port**



|   |                            |   |                          |
|---|----------------------------|---|--------------------------|
| 1 | Internal hard drive LED    | 4 | USB0 and USB1 connectors |
| 2 | External USB Flash LED     | 5 | Cisco ASR1000-RP1 LEDs   |
| 3 | Internal USB bootflash LED |   |                          |



**Caution**

Do not remove a USB Flash memory module when issuing some file access command or a read/write operation to the Flash memory module when it is processing. The router might reload or the USB Flash memory module can be damaged. You can check to see if the USB activity LED on the Cisco ASR1006 or ASR1004 router RP1 front panel is flashing, prior to the removal of the USB device (does not apply to the Cisco ASR1002 Router).

To remove and then replace a USB 1GB flash token memory stick, follow these steps:

**Step 1** Pull the memory stick from the USB port.

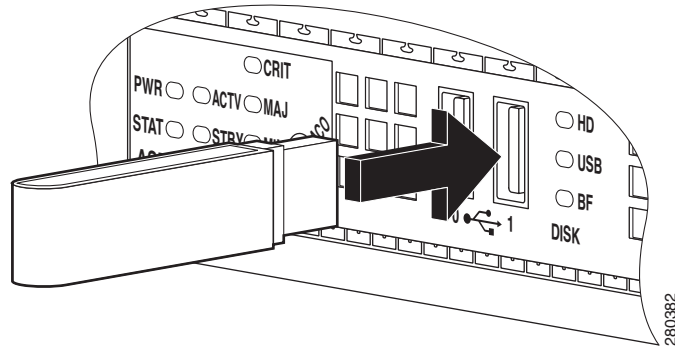


**Note** The Cisco ASR 1002 Router has only one USB port.

**Step 2** To replace a Cisco USB Flash memory stick, simply insert the module into the USB port 0 or 1 port as shown in Figure 8-14. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.



**Note** Figure 8-12 is only a sample of how the memory stick is inserted into the port and does not display the Cisco ASR 1000 RP1 face-plate.

**Figure 8-14 Cisco ASR 1000 Series Route Processor 1 Flash Token Memory Stick****Note**

You can insert or remove the memory stick whether the router is powered on or not.

This completes the USB Flash memory installation procedure.

## Removing and Replacing the Cisco ASR 1000 Series Embedded Service Processors

The following sections describe the procedures for replacing a Cisco ASR 1000 Series Embedded Service Processors (Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, or Cisco ASR1000-ESP20) in your system. The module also contains card handles to assist in insertion and removal of the module and retention of the module into the chassis. The Cisco ASR 1000 Series Embedded Services Processors have no front panel I/O connectors.

**Note**

The Cisco ASR 1000 Series Embedded Services Processor is a field-replaceable unit in the Cisco ASR 1002 Router and the Cisco ASR 1002 Router supports only the Cisco ASR1000-ESP5 and Cisco ASR1000-ESP10, not the Cisco ASR1000-ESP20.

**Note**

Before beginning the procedure, verify that your system meets the minimum requirements as described in [Chapter 2, “Cisco ASR 1000 Series Routers Components.”](#)

### Removing a Cisco ASR1000-ESP

To remove the Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, or Cisco ASR1000-ESP20 from the Cisco ASR 1000 Series Routers, follow this procedure:

- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit. Loosen the captive screws on the Cisco ASR 1000 Series Embedded Services Processor.

- Step 2** Using the handles on both sides of the module, with two hands gently slide the Cisco ASR 1000 Series Embedded Services Processor (ESP5, ESP10, ESP20) out of the chassis slot.



**Note** Handle the Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, or Cisco ASR1000-ESP20 by the carrier edges only; never touch the printed circuit board components or connector pins.

- Step 3** Place the Cisco ASR1000-ESP5, Cisco ASR1000-ESP10, or Cisco ASR1000-ESP20 on an antistatic surface with its printed circuit board components facing upward or in a static shielding bag.

You have completed the removal procedure for the Cisco ASR 1000 Series Embedded Services Processor. from a Cisco ASR1000-ESP.

## Replacing the Cisco ASR1000-ESP

To replace the Cisco ASR 1000 Series Embedded Services Processor in the Cisco ASR 1000 Series Router, follow this procedure:

- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
- Step 2** Remove the new Cisco ASR1000-ESP from its static shielding bag.
- Step 3** Using both hands, grasp the Cisco ASR1000-ESP by its metal carrier edges and orient the it so that its printed circuit board components are upward.



**Caution** Handle the Cisco ASR1000-ESP by the carrier edges and handle only; never touch the printed circuit board components or connector pins.

- Step 4** Align the left and right edges of the Cisco ASR1000-ESP printed circuit board between the Cisco ASR1000-ESP slot guides.
- Step 5** Gently slide the Cisco ASR1000-ESP all the way into its chassis slot until you feel the connectors seat with the router midplane.
- Step 6** Seat the Cisco ASR1000-ESP in the router midplane by tightening its captive installation screws with a number 2 Phillips or a 3/16-inch flat-blade screwdriver.

This completes the procedure for replacing the Cisco ASR1000-ESP in a Cisco ASR1000 Series Router.

# Removing and Replacing a SPA Interface Processor

The Cisco ASR 1006 Router supports three SPA Interface Processors (SIPs) and the ASR 1004 Router supports two SIPs and shared port adapters (SPAs). Online insertion and removal (OIR) is supported on the SIPs and SPAs.

**Note**

For detailed information about SIP and SPA software commands such as activating and deactivating SIPs, prepare for online insertion and removal of SPAs, and activate and deactivate configuration examples, see the [Cisco ASR 1000 Series Aggregation Services Routers SIP and SPA Hardware Installation Guide](#).

**Note**

The embedded shared port adapter interface processor (SIP) on the Cisco ASR 1002 Router does not support online insertion and removal. However, the SPAs on the Cisco embedded ASR1000-SIP10 do support online insertion and removal.

**Caution**

When removing or replacing SPAs, make certain that all the screw fasteners on each card and each SIP are screwed in tightly to prevent accidental removal of another card. Each SIP has two screw fasteners per slot and each SPA has two screw fasteners.

We suggest you have the following tools and parts readily available for installation of the SIPs and SPAs:

- Number 2 Phillips or a 3/16-inch flat-blade screwdriver
- Shared port adapter interface processor (SIP)
- Shared port adapters (SPAs)
- Cables
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, field-replaceable units (FRUs), and spares
- Antistatic mat or surface, or static shielding bag

If you need additional equipment, contact a service representative for ordering information.

## Electrostatic Discharge Prevention

Electrostatic discharge (ESD) damages equipment and impairs electrical circuitry. ESD occurs when printed circuit boards are improperly handled and results in complete or intermittent failures.

Each SPA circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage. The SIP and SPAs consist of a printed circuit board that is fixed in a metal carrier.

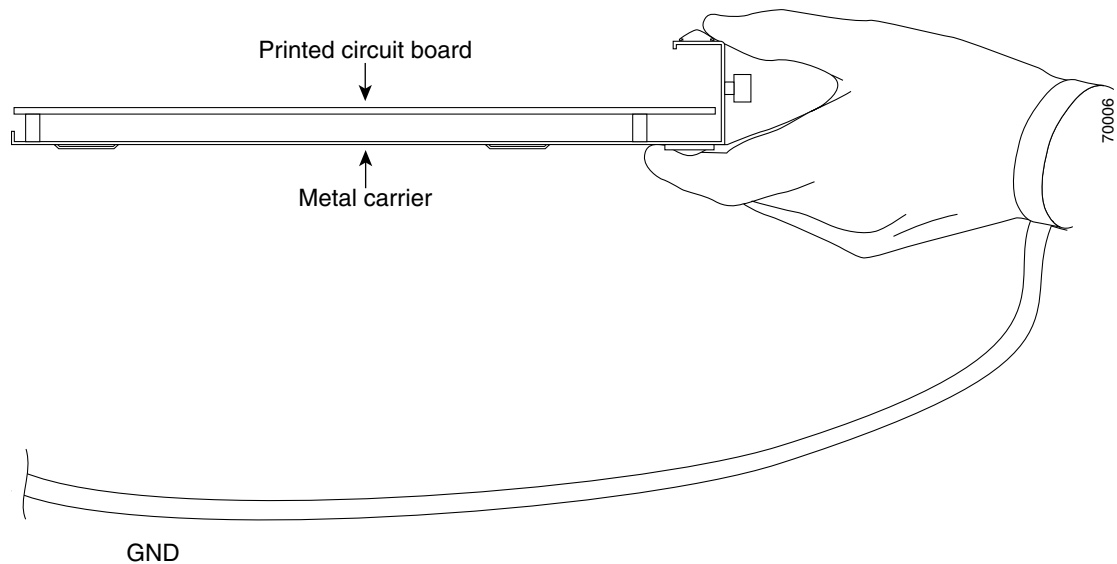
Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier.

When a subslot is not in use, a SPA blank filler plate must fill the empty subslot to allow the router to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a SPA in a subslot that is not in use, you must first remove the SPA blank filler plate.

**Caution**

Always handle the SIP by the carrier edges and its handle; never touch the SIP components or connector pins.

**Figure 8-15** Handling the Cisco ASR 1000 Series SPA Interface Processor



|          |                       |          |               |
|----------|-----------------------|----------|---------------|
| <b>1</b> | Printed circuit board | <b>2</b> | Metal carrier |
|----------|-----------------------|----------|---------------|

Although the metal carrier helps to protect the SIP and SPA from ESD, wear a preventive antistatic strap whenever handling the SIP and SPA. Ensure that the strap makes good skin contact and connect the strap's clip to an unpainted chassis surface to safely channel unwanted ESD voltages to ground.

If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist strap or ankle strap when installing or replacing the Cisco ASR 1000 Series SPA Interface (SIP) and shared port adapter. Ensure that the ESD strap makes contact with your skin.
- Handle the Cisco ASR 1000 Series SPA Interface (SIP) or shared port adapter by its metal carrier edges and handles; avoid touching the printed circuit board or any connector pins.
- When removing an Cisco ASR 1000 Series SPA Interface (SIP) or shared port adapter, place it on an antistatic surface with the printed circuit board components facing upward, or in a static shielding bag. If you are returning a shared port adapter or Cisco ASR 1000 Series SPA Interface (SIP) to the factory, immediately place it in a static shielding bag.

## Removing a SPA Interface Processor

To remove a SPA Interface Processor (SIP), follow these steps.

- 
- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit. Loosen the captive screws on the Cisco ASR 1000 Series SPA Interface Processor.
- Step 2** Using the handles on both sides of the module, with two hands gently slide the Cisco ASR 1000 Series SPA Interface Processor out of the chassis slot.



**Note** Handle the Cisco ASR1000-SIP10 by the card edges only; never touch the printed circuit board components or connector pins.

---

- Step 3** Place the Cisco ASR1000-SIP10 on an antistatic surface with its printed circuit board components facing upward or in a static shielding bag.

For detailed information about installing and removing SIPs and SPAs, see the [Cisco ASR 1000 Series Aggregation Services Routers SIP and SPA Hardware Installation Guide](#).

---

You have completed the removal procedure for the Cisco ASR1000-SIP10.

## Replacing a SPA Interface Processor

To replace a SPA Interface Processor (SIP), follow these steps.

- 
- Step 1** Before inserting a SIP, make sure that the chassis is grounded.
- Step 2** To insert the SIP, carefully align the edges of the SIP between the upper and lower edges of the router slot.
- Step 3** Carefully slide the SIP into the router slot until the SIP makes contact with the backplane.
- Step 4** Tighten the locking thumbscrews on both sides of the SIP.
- Step 5** Connect all cables to each SPA.
- 

## Removing a Shared Port Adapter From a SIP

To remove a shared port adapter (SPA), follow these steps.

- 
- Step 1** Attach an ESD wrist strap between you and an unpainted chassis surface.
- Step 2** Shut down the interface so that there is no traffic running through the shared port adapter when it is removed.



**Caution**

Removing a shared port adapter while traffic is flowing through the ports can cause system disruption.

---

Refer to the following example to shut down the interface FastEthernet0/1/0 on the 8-Port Fast Ethernet Shared Port Adapter (SPA-8X1FE-TX-V2).

- a. At the router# prompt, type:  
**configure terminal** and press Enter. The global configuration mode prompt Router (config)# appears.
- b. At the router (config)# prompt, type:  
**interface FastEthernet0/1/0** and press Enter. The interface configuration mode prompt Router(config-if)# appears.
- c. At the router (config-if)# prompt, type:  
**shutdown** and press Enter. This disables the interface FastEthernet0/1/0.
- d. At the router(config-if)# prompt, type:  
**end** and press Enter. The privileged EXEC mode prompt Router# appears.

**Step 3** Disconnect all cables from the shared port adapter.

**Step 4** Unscrew the captive installation screws on either side of the SPA.

**Step 5** Grasp the handles and pull the SPA from the SIP.

---

You have completed the removal procedure for the Cisco ASR1000 Series SPA.

## Replacing a Shared Port Adapter In a SIP

To replace a shared port adapter in a SIP module, follow these steps:

- Step 1** To insert the SPA in the SIP, locate the guide rails inside the SIP that hold the SPA in place. They are at the top left and top right of the SPA slot and are recessed about an inch.
  - Step 2** Carefully slide the SPA all the way in the SIP until the SPA is firmly seated in the SPA interface connector. When fully seated, the SPA might be slightly behind the SIP faceplate.
  - Step 3** After the SPA is properly seated, fasten the SPA in place with the captive installation screws on either side of the SPA.
- 

## Removing and Replacing a Cisco ASR 1006 Router Power Supply

This section provides information about removing and replacing the following power supplies in a Cisco ASR 1006 Router:

- AC power supply
- DC power Supply



## Removing the AC Power Supply from Cisco ASR 1006 Router

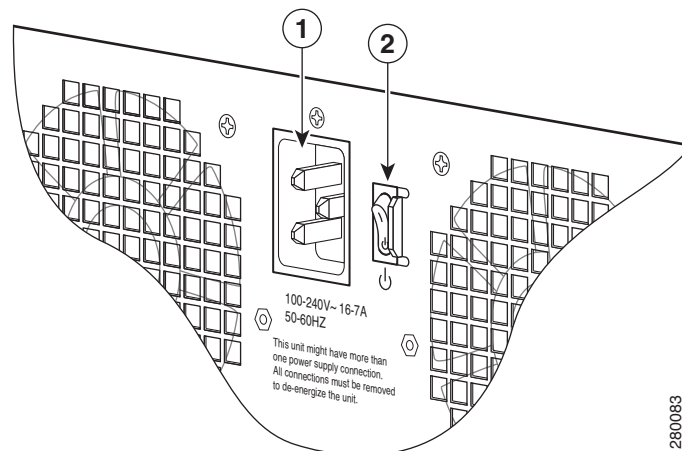
Because of the power supply redundancy, there is no need to power off the Cisco ASR 1006 Router before removing one of the AC power supplies.

The Cisco ASR 1006 Router has two of the same type power supplies in power supply slot 0 and power supply slot 1.

To remove a Cisco ASR 1006 Router AC power supply that is not operating normally (and then replace the AC power supply within five minutes), follow this procedure:

- 
- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 2** Before you turn off a power supply, make certain the chassis is grounded.
- Step 3** Turn the power supply Standby switch to the Standby position.

**Figure 8-16 AC Power Inlet and Standby Switch**



|          |             |          |                                |
|----------|-------------|----------|--------------------------------|
| <b>1</b> | Power inlet | <b>2</b> | Power supply AC Standby switch |
|----------|-------------|----------|--------------------------------|

- Step 4** Unplug the power cable from the AC inlet on the back of the power supply and the power source.
- Step 5** Unscrew the power supply captive screws.



**Note** Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.



**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

- Step 6** Grasping the power supply handles, pull the power supply from the chassis.
- Step 7** Replace the AC power supply within 5 minutes.

This completes the procedure for removing the AC power supply from the Cisco ASR1006 chassis.

## Replacing the AC Power Supply in Cisco ASR 1006 Router

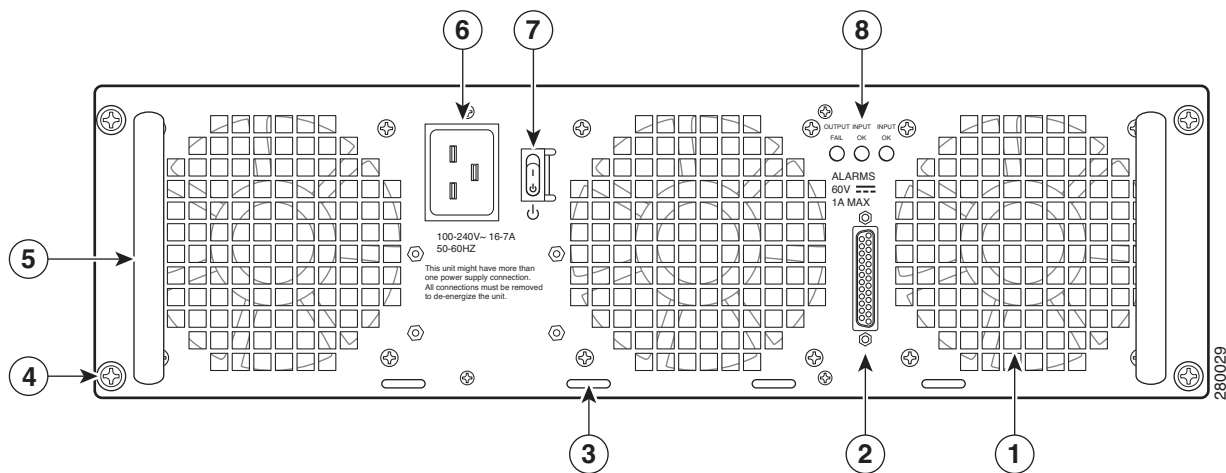
This section provides information about installing an AC power supply in the Cisco ASR 1006 Router.



### Warning

**Never install an AC power module and a DC power module in the same chassis.** Statement 1050

**Figure 8-17** Cisco ASR 1006 Router AC Power Supply



|          |                                       |          |                                                                                                                                                                 |
|----------|---------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | AC power supply fan                   | <b>5</b> | AC power supply handle                                                                                                                                          |
| <b>2</b> | AC power supply DB-25 alarm connector | <b>6</b> | AC power inlet                                                                                                                                                  |
| <b>3</b> | Cable tie wrap tabs                   | <b>7</b> | AC power supply Standby switch (standby symbol is a broken circle with a vertical line through the top of it). A Standby switch is not considered a disconnect. |
| <b>4</b> | AC power supply captive screws        | <b>8</b> | AC power supply LEDs                                                                                                                                            |

- Step 1** Insert an AC power supply in power supply slot 0 or power supply slot 1 until it is fully seated.
- Step 2** Tighten the captive screws.
- Step 3** Insert the AC power cable.
- Step 4** Plug the power supply cable into the power source.
- Step 5** Turn the power supply Standby switch to the On (I) position.

This completes the procedure for installing the AC power supply in the Cisco ASR 1006 Router.

## Removing and Replacing a DC Power Supply in Cisco ASR 1006 Router

This section provides information about removing and installing a DC power supply in the Cisco ASR 1006 Router.



**Warning**

**When you install the unit, the ground connection must always be made first and disconnected last.**  
Statement 1046



**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**  
Statement 1003

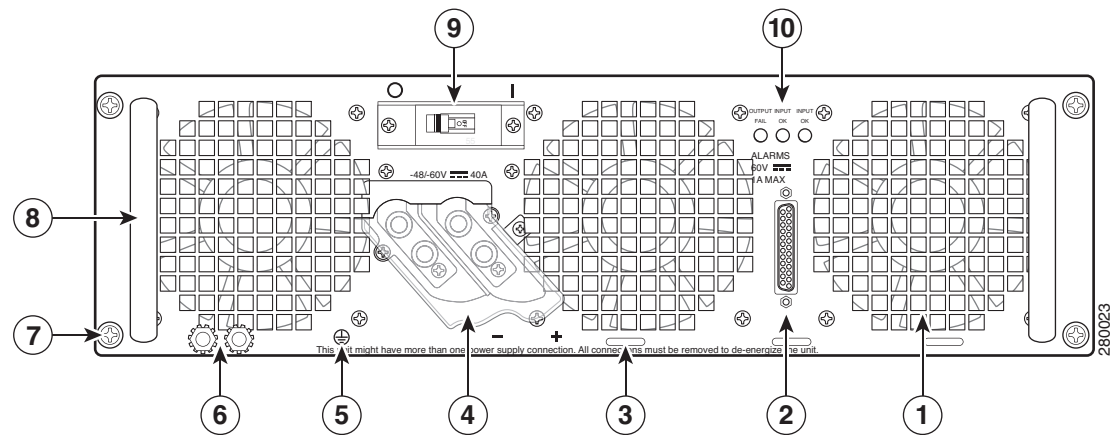


**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

Figure 8-18 shows the DC power supply and components for the Cisco ASR 1006 Router.

**Figure 8-18 Cisco ASR 1006 Router DC Power Supply**



|   |                                                  |    |                                     |
|---|--------------------------------------------------|----|-------------------------------------|
| 1 | Fan                                              | 6  | DC power supply ground studs        |
| 2 | DB-25 terminal alarm connector                   | 7  | DC power supply captive screw       |
| 3 | Tie-wrap tab                                     | 8  | DC power supply handle              |
| 4 | DC power supply terminal block and plastic cover | 9  | On/Off (I/O) circuit breaker switch |
| 5 | Earth ground symbol                              | 10 | Power supply LEDs:                  |



**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**  
Statement 1003

**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

**Warning**

**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

## Removing the DC Power Supply from Cisco ASR 1006 Router

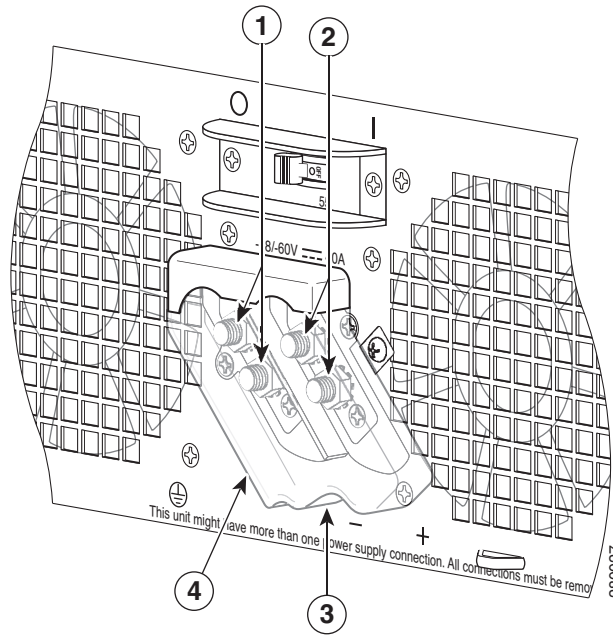
Before you can remove a DC power supply from the Cisco ASR 1006 Router, you must remove power from the power supply. Follow these steps to remove power and the DC power supply from the chassis.

**Caution**

Make certain that the chassis ground is connected before you begin removing and installing the power supply. For the chassis ground stud location.

- 
- Step 1** Before servicing the power supply, switch the circuit breaker Off in your equipment area. As an additional precaution, tape the circuit breaker switch in the Off position.
- Step 2** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 3** Switch the power supply circuit breaker switch to Off (O).
- Step 4** Locate the terminal block on the rear of the chassis on the power supply.

[Figure 8-19](#) shows the DC power supply terminal block.

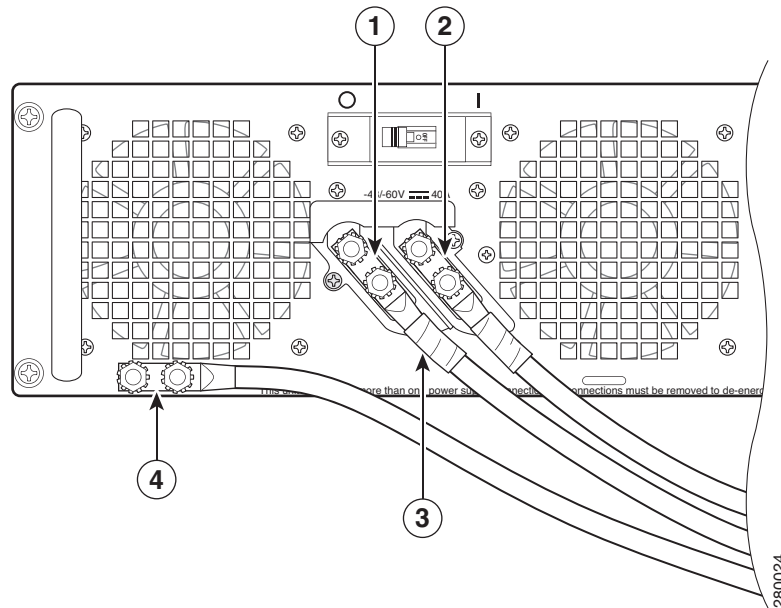
**Figure 8-19 Cisco ASR 1006 Router DC Power Supply Terminal Block and Plastic Cover**

|   |                   |   |                              |
|---|-------------------|---|------------------------------|
| 1 | Negative terminal | 3 | Plastic cover slotted area   |
| 2 | Positive terminal | 4 | Terminal block plastic cover |

**Step 5** Remove the slotted plastic cover from the terminal block (Figure 8-19).

- a. Loosen and remove the single screw on the plastic cover. The plastic cover has slots that help to slide it out diagonally from the terminal block.
- b. Using a nut driver (7/16 size), unscrew the positive kepnut, positive cable, and the flat washer, in that order.  
The terminal block houses two double-hole barrel lugs.
- c. Follow Step 4b and remove the negative cable.

Figure 8-20 shows the DC power supply terminal block with cables connected.

**Figure 8-20 Cisco ASR 1006 Router DC Power Supply Terminal Block Cable Connections**

|          |               |          |                                               |
|----------|---------------|----------|-----------------------------------------------|
| <b>1</b> | Negative lead | <b>3</b> | Protective sleeving around the stud and cable |
| <b>2</b> | Positive lead | <b>4</b> | Earth ground stud and cable                   |

**Step 6** Locate the power supply ground stud (Figure 8-20). Remove the earth ground (GND) cable from the DC power supply.

**Step 7** Loosen and remove the Kepnut screw, washer, and ground lug in that order.

**Warning**

**When installing the unit, the ground connection must always be made first and disconnected last.**

**Step 8** Loosen the four captive screws on the DC power supply.

**Note**

Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.

**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

**Step 9** Grasping the power supply handles, pull the power supply from the chassis.

**Step 10** Replace the DC power supply within five minutes.

---

This completes the procedure of removing a DC power supply from the Cisco ASR 1006 Router.

## Replacing the DC Power Supply in Cisco ASR 1006 Router

**Note**

The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground (GND), black is used for -48V on negative (–) terminal and red is used for RTN on the positive (+) terminal. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.

**Warning**

**When you install the unit, the ground connection must always be made first and disconnected last.**  
Statement 1046

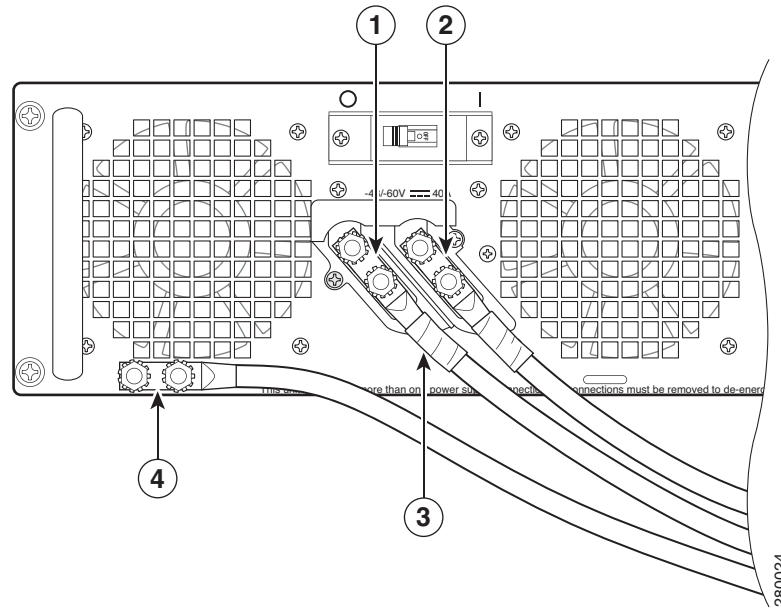
To install the DC power supply, follow these steps:

- 
- Step 1** Grasp the DC power supply by the two handles and carefully slide it into the chassis. Make sure you align the rear connector to the backplane until it is fully seated.
- Step 2** Tighten the captive screws on the power supply.
- Step 3** Make certain that the chassis ground is connected before you begin installing the DC power supply.
- Step 4** Locate the ground stud on the DC power supply for the **GND** connection which must be installed first and follow these steps:
- a. Using the grounding lug, replace the washers and Kepnut screw in the following order.
    - Flat washer
    - Grounding cable lug
    - Kepnut screw
  - b. Tighten the Kepnut screws (use the screwdriver to tighten the ground screw to a torque of 20+/-2 in-lbs / 2 per.) on the power supply ground studs.
- Step 5** Attach the other end of the ground cable to the site ground associated to the DC power supply system that you are working on.
- Step 6** Remove the plastic cover from the terminal block if it is still on.

**Caution**

Before you continue to install the terminal block ground wires, stop and perform Step 7. This is to prevent any contact between the metal power lugs and plastic cover.

- Step 7** You must wrap the positive and negative power cables with sleeving. Take each wire and cover the area from the lug to the wire with heavy shrink sleeving (see [Figure 8-21](#).)

**Figure 8-21 Cisco ASR 1006 Router DC Power Supply Terminal Block Ground Lugs**

|          |                                                                            |          |                             |
|----------|----------------------------------------------------------------------------|----------|-----------------------------|
| <b>1</b> | Negative lug and wire with sleeving wrapped around the wire and end of lug | <b>3</b> | Protective sleeving area    |
| <b>2</b> | Positive lug and wire with sleeving wrapped around the wire and end of lug | <b>4</b> | Earth ground stud and cable |

**Step 8** For easier cable-management, insert the positive cable first. Replace the ground lug with cable in the following order:

- a. Flat Washer
- b. Ground lug with positive wire
- c. Kepnut screw

**Step 9** Tighten the Kepnut screw (use the screwdriver to tighten the ground screw in the terminal block to a torque of 20+/-2 in-lbs / 2 per.) and repeat the same steps for the negative wires.



**Note** Secure the wires coming in from the terminal block so that they cannot be disturbed by casual contact.

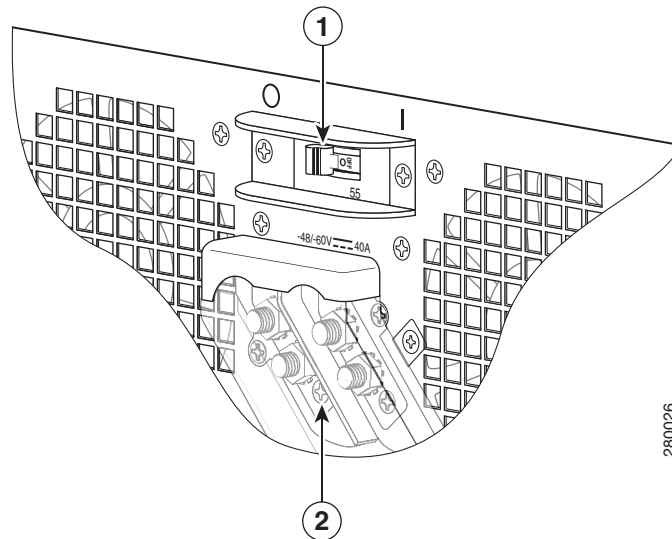
**Step 10** Use tie wraps to secure the wires, so that the wires are not pulled from the terminal block by casual contact. Tie-wrap studs are located below the power supply terminal block.



**Note** The ground wire must contain a loop when securing it to the tie-wrap tab to prevent it from being pulled out.

**Step 11** Replace the terminal block plastic cover, which is slotted and keyed to fit correctly over the terminal block; then tighten the black screw (use the screwdriver to tighten the screw to a torque of 5 in-lbs / 1 per.).



**Figure 8-22 Cisco ASR 1006 Router DC Power Supply Terminal Block Plastic Cover and Switch**

|          |                               |          |                                          |
|----------|-------------------------------|----------|------------------------------------------|
| <b>1</b> | DC power supply On/Off switch | <b>2</b> | Terminal block plastic cover black screw |
|----------|-------------------------------|----------|------------------------------------------|

**Step 12** Remove the tape from the circuit-breaker On/Off switch.

**Step 13** Switch the circuit breaker On/Off switch to the On (I) position.

**Note**

The requirement for maximum torque applied to the power or ground Kepnuts must be 8 in-lb when the power or ground lug is not present.

This completes the procedure for installing the DC power supply into the Cisco ASR 1006 Router.

## Removing and Replacing a Cisco ASR 1004 Router Power Supply

This section provides information about removing and replacing the following power supplies in a Cisco ASR 1004 Router:

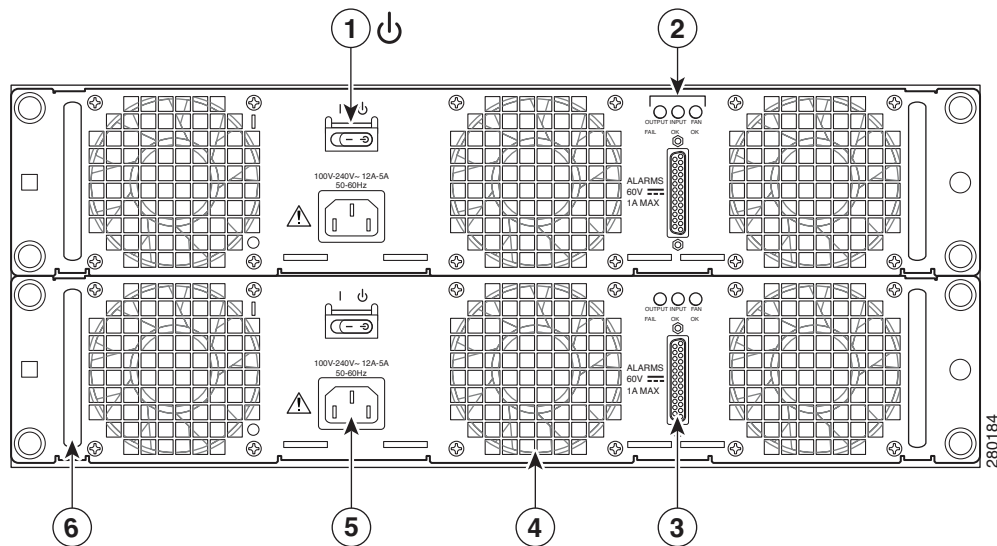
- AC power supply
- DC power Supply

### Removing the AC Power Supply from Cisco ASR 1004 Router

Because of the power supply redundancy, there is no need to power off the Cisco ASR 1004 Router before removing one of the AC power supplies.

The Cisco ASR 1004 Router has two of the same type power supplies in power supply Slot 0 and power supply Slot 1.

**Figure 8-23 Cisco ASR 1004 Router AC Power Supply Slot 0 and Slot 1**



|   |                                |   |                        |
|---|--------------------------------|---|------------------------|
| 1 | AC power supply Standby switch | 4 | AC power supply fan    |
| 2 | AC power supply LEDs           | 5 | AC power inlet         |
| 3 | DB-25 alarm connector          | 6 | AC power supply handle |

Following these steps to remove an AC power supply from the Cisco ASR 1004 Router.

- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 2** Before you turn off a power supply, make certain the chassis is grounded.
- Step 3** Turn the power supply Standby switch to the Standby position.
- Step 4** Unplug the power cable from the AC inlet on the back of the power supply and the power source.
- Step 5** Unscrew the four power supply captive screws and grasp the handles on both sides of the power supply.



**Note** Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.



**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

- Step 6** Grasping the power supply handles, pull the power supply from the chassis.
- Step 7** Replace the AC power supply within five minutes.
- 

This completes the procedure for removing the AC power supply from the Cisco ASR1004 chassis.

## Replacing the AC Power Supply in Cisco ASR 1004 Router

This section provides information about installing an AC power supply in the Cisco ASR 1004 Router.



---

**Never install an AC power module and a DC power module in the same chassis.** Statement 1050

---

- Step 1** Insert an AC power supply in power supply slot 0 or power supply slot 1 until it is fully seated.
- Step 2** Tighten the captive screws.
- Step 3** Insert the AC power cable.
- Step 4** Plug the power supply cable into the power source.
- Step 5** Turn the power supply Standby switch to On (I) position.
- 

This completes the procedure for installing the AC power supply in a Cisco ASR 1004 Router.

## Removing and Replacing a DC Power Supply in Cisco ASR 1004 Router

This section provides information about removing and installing a DC power supply in the Cisco ASR 1004 Router.



---

**When you install the unit, the ground connection must always be made first and disconnected last.** Statement 1046

---



---

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1003

---



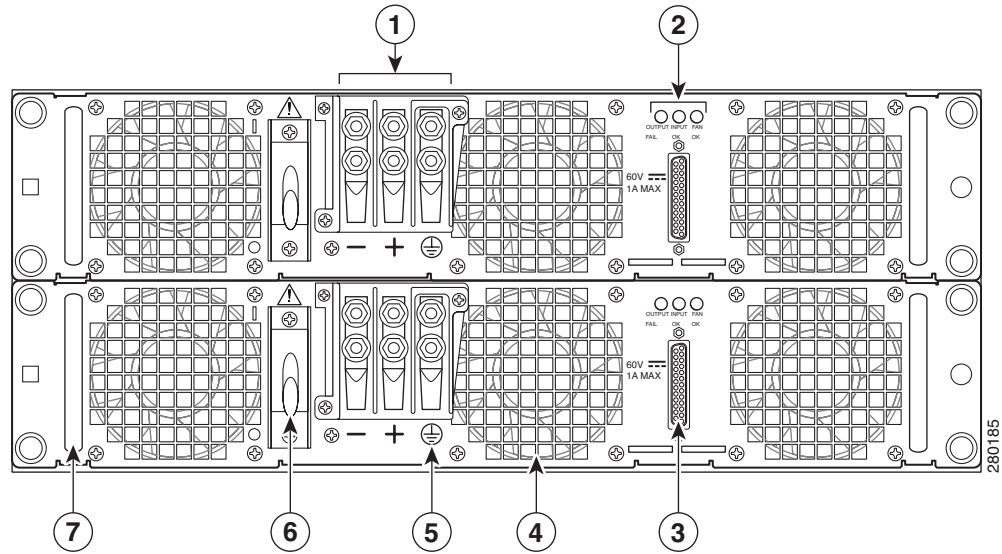
---

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

---

Figure 8-24 shows the DC power supply and components for the Cisco ASR 1004 Router.

**Figure 8-24 Cisco ASR 1004 Router DC Power Supply**



|   |                                                  |   |                                     |
|---|--------------------------------------------------|---|-------------------------------------|
| 1 | DC power supply terminal block and plastic cover | 5 | DC power supply earth ground symbol |
| 2 | DC power supply LEDs                             | 6 | DC power supply On (I)/ Off (O)     |
| 3 | DB-25 alarm connector                            | 7 | DC power supply handle              |
| 4 | DC power supply fan                              |   |                                     |



**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**  
Statement 1003



**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030



**Warning**

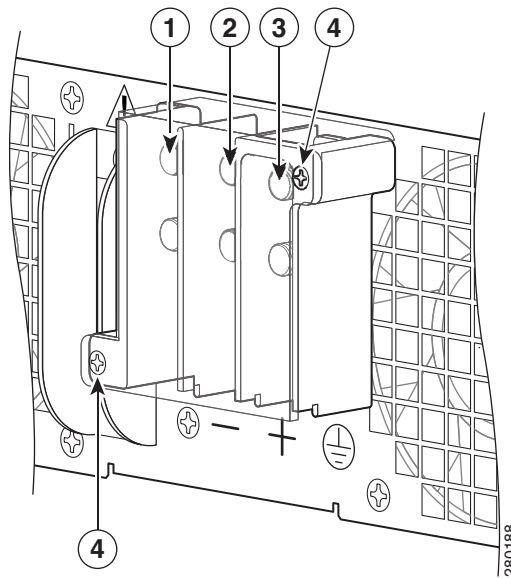
**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

## Removing the DC Power Supply From Cisco ASR 1004 Router

Before you can remove a DC power supply from the Cisco ASR 1004 Router, you must remove power from the power supply. Follow these steps to remove power and the DC power supply from the chassis.

- Step 1** Make certain that the chassis ground is connected before you begin removing the DC power supply.
- Step 2** Switch the power supply circuit breaker switch to Off (O).
- Step 3** Locate the terminal block on the rear of the chassis on the power supply. [Figure 8-24](#) shows the DC power supply terminal block.
- Step 4** Remove the slotted plastic cover from the terminal block.

**Figure 8-25 Cisco ASR 1004 Router DC Power Supply Terminal Block**

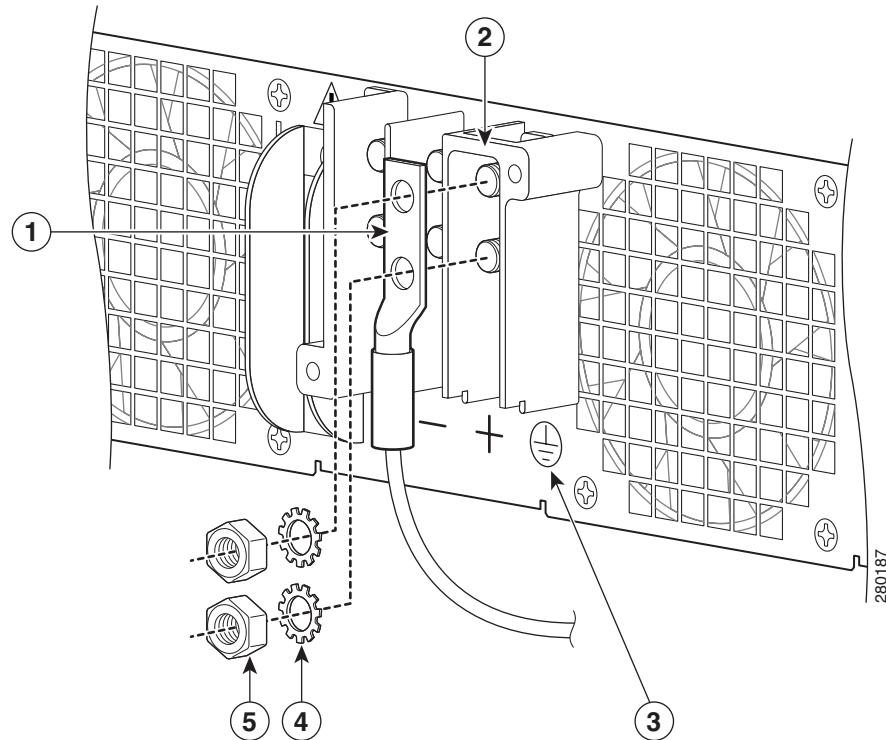


|          |                   |          |                                     |
|----------|-------------------|----------|-------------------------------------|
| <b>1</b> | Negative terminal | <b>3</b> | Earth ground stud                   |
| <b>2</b> | Positive terminal | <b>4</b> | Terminal block plastic cover screws |

- a. Loosen and remove the two #10 screws from the plastic cover. The plastic cover has slots that help to slide it out towards the right.
- b. Using a nut driver (7/16 size), unscrew the positive kepnut, positive cable, and the flat washer, in that order. The terminal block houses two double-hole barrel lugs.
- c. Follow Step 4b and remove the negative cable.

Figure 8-26 shows the DC power supply terminal block with lead wires connected.

**Figure 8-26 Cisco ASR 1004 Router DC Power Supply Terminal Block Lead Wire Connection**



|   |                      |   |              |
|---|----------------------|---|--------------|
| 1 | Ground stud and wire | 4 | Flat washer  |
| 2 | Ground lug nut       | 5 | Kepnut screw |
| 3 | Earth ground symbol  |   |              |

**Step 5** Locate the power supply ground stud (Figure 8-20). Remove the earth ground (GND) cable from the DC power supply.

**Step 6** Loosen and remove the Kepnut screw, washer, and ground lug in that order.



**Warning**

**When installing the unit, the ground connection must always be made first and disconnected last.**

**Step 7** Loosen the captive screws on the DC power supply.



**Note**

Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.

**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

**Step 8** Grasping the power supply handles, pull the power supply from the chassis.

**Step 9** Replace the DC power supply within five minutes.

This completes the procedure of removing a DC power supply from the Cisco ASR 1004 Router.

## Replacing the DC Power Supply in Cisco ASR 1004 Router

**Note**

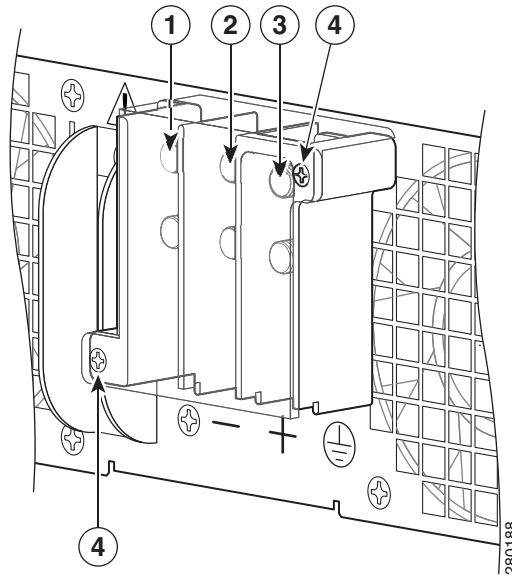
The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground (GND), black is used for negative (–) terminal and red is used for the positive (+) terminal. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.

**Warning**

**When you install the unit, the ground connection must always be made first and disconnected last.**  
Statement 1046

To install the DC power supply, follow these steps:

- Step 1** Make certain that the chassis ground is connected before you begin installing the DC power supply.
- Step 2** Grasp the DC power supply by the two handles and carefully slide it into the chassis. Make sure you align the rear connector to the backplane until it is fully seated.
- Step 3** Tighten the captive screws on the power supply.
- Step 4** Locate the power supply terminal block and remove the plastic cover from the terminal block:
- Unscrew and remove the two #10 screws.
  - Slide the cover off the terminal block towards the right.

**Figure 8-27 Cisco ASR 1004 Router DC Power Supply Terminal Block**

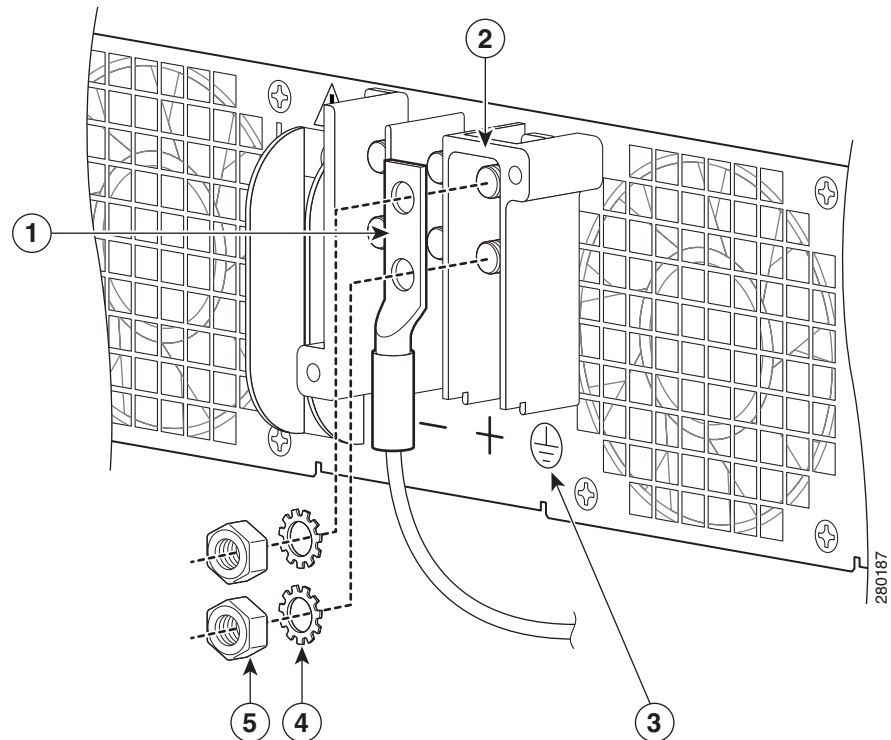
|          |                                   |          |                                       |
|----------|-----------------------------------|----------|---------------------------------------|
| <b>1</b> | DC power supply negative terminal | <b>3</b> | DC power supply earth ground terminal |
| <b>2</b> | DC power supply positive terminal | <b>4</b> | Terminal block plastic cover screws   |

**Caution**

Before you continue to install the terminal block ground wires, stop and perform Step 5 to prevent any contact with metal lead on the ground wire and the plastic cover.

- Step 5** You must wrap the positive and negative cables with sleeving. Take each ground wire and cover the area from the lug to the wire with heavy shrink sleeving (see [Figure 8-20](#)).
- Step 6** Attach the GND wire first and follow this order:
- Flat Washer
  - Ground lug with grounding wire
  - Kepnut screw
- Step 7** Tighten the KEP-style hex nut screws (use the screwdriver to tighten the ground screw in the terminal block to a torque of 18-22 in-lbs) on the power supply studs
- Step 8** Insert the positive ground cable. Replace the ground lug with cable in the following order:
- Flat Washer
  - Ground lug with positive wire
  - Kepnut screw
- Step 9** Tighten the KEP-style hex nut screws (use the screwdriver to tighten the positive ground screw in the terminal block to a torque of 18-22 in-lbs) on the power supply ground studs and repeat the same steps for the negative ground stud and wire.



**Figure 8-28 Cisco ASR 1004 Router DC Power Supply Terminal Block Ground Cables**

|          |                      |          |              |
|----------|----------------------|----------|--------------|
| <b>1</b> | Ground stud and wire | <b>4</b> | Flat washer  |
| <b>2</b> | Ground lug nut       | <b>5</b> | Kepnut screw |
| <b>3</b> | Earth ground symbol  |          |              |

**Note**

Secure the wires coming in from the terminal block so that they cannot be disturbed by casual contact.

- Step 10** Use tie wraps to secure the wires, so that the wires are not pulled from the terminal block by casual contact. Tie-wrap studs are located below the power supply terminal block.

**Note**

The ground wire must contain a loop when securing it to the tie-wrap tab to prevent it from being pulled out.

- Step 11** Replace the terminal block plastic cover and tighten the screws. The plastic cover slides in easily over the terminal block.
- Step 12** If you taped the circuit breaker, then remove the tape from the circuit-breaker switch handle and move the circuit-breaker handle to the on position.
- Step 13** Switch the power supply circuit breaker switch to the On (I) position.

This completes the procedure for connecting the DC power supply in the Cisco ASR 1004 Router.

# Removing and Replacing a Cisco ASR 1002 Router Power Supply

This section provides information about removing and replacing the following power supplies in a Cisco ASR 1002 Router:

- AC power supply
- DC power Supply

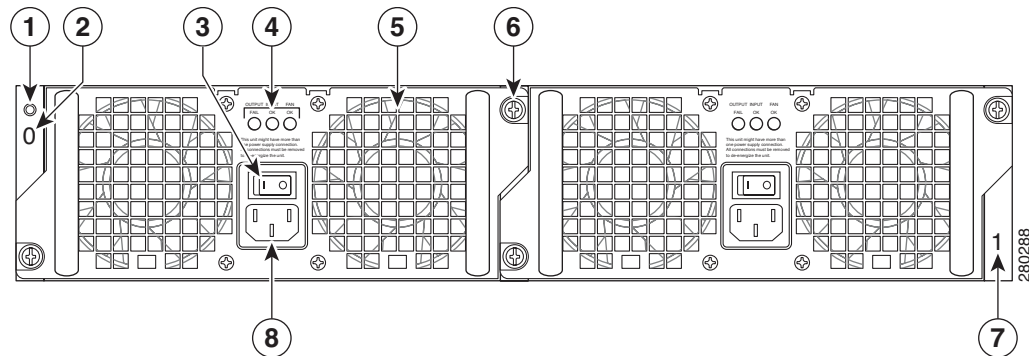


## Note

You must have both power supplies installed in the Cisco ASR 1002 Router.

The Cisco ASR 1002 Router has two of the same type power supplies in power supply slot 0 and power supply slot 1.

**Figure 8-29 Cisco ASR 1002 Router AC Power Supply**



|   |                                        |   |                                            |
|---|----------------------------------------|---|--------------------------------------------|
| 1 | AC power supply ESD socket             | 5 | AC power supply fan                        |
| 2 | AC power supply slot number 0          | 6 | AC power supply captive installation screw |
| 3 | AC power supply On (I) /Off (O) switch | 7 | AC power supply slot number 1              |
| 4 | AC power supply LEDs                   | 8 | AC power inlet                             |

## Removing the AC Power Supply from Cisco ASR 1002 Router

To remove the AC power supply from the Cisco ASR 1002 Router, follow these steps:

- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 2** Turn the switch to the Off (O) position, remove wiring, and unplug the AC cord.
- Step 3** Unscrew all of the power supply captive screws.



## Note

Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.

**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

- Step 4** Grasping the power supply handles, pull the power supply from the chassis.
- Step 5** Replace the AC power supply within five minutes.

This completes the procedure for removing the AC power supply from the Cisco ASR1002 chassis.

## Replacing the AC Power Supply in Cisco ASR 1002 Router

This section provides information about installing an AC power supply in the Cisco ASR 1002 Router.

**Warning**

**Never install an AC power module and a DC power module in the same chassis.** Statement 1050

- Step 1** Insert an AC power supply in power supply slot 0 or power supply slot 1 until it is fully seated.
- Step 2** Tighten the captive screws.

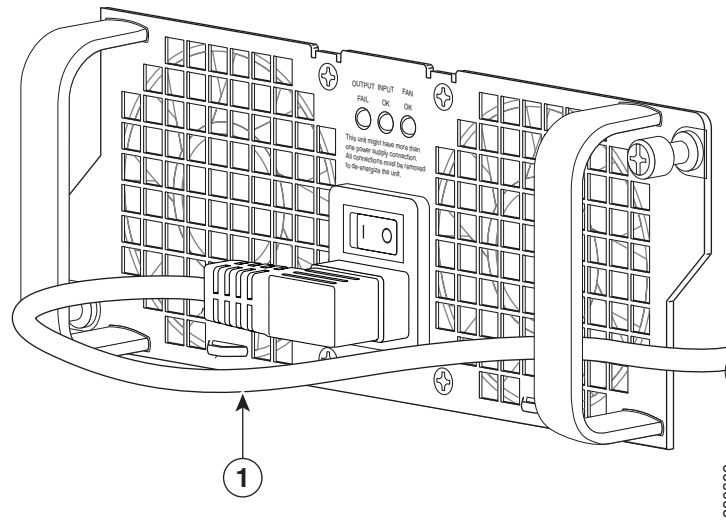
To connect AC power to the Cisco ASR 1002 Router, follow these steps:

- Step 1** At the rear of the router, check that the power switch is in the Off (O) position.



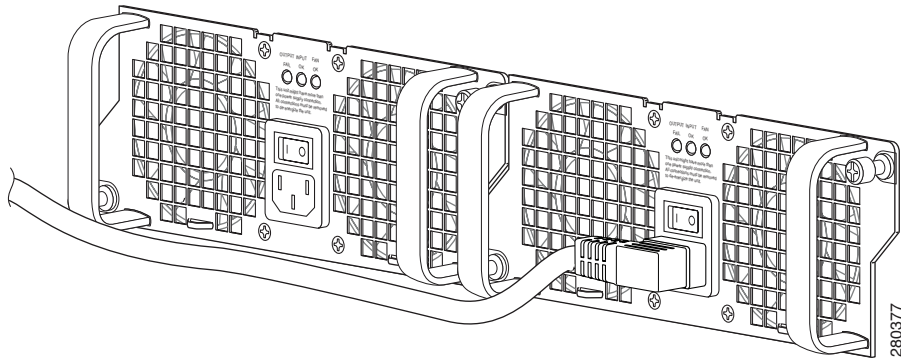
**Note** Turn the power switch to the On (I) position after both power sides of the power cord are connected.

- Step 2** Insert the AC power cable into the AC power inlet and then turn On (I).
- Step 3** To ensure that the AC power cord does not interfere with other cables or wires, dress the AC power cable in one of the following ways.
- Leave a small service loop in the AC power cord from the inlet and then secure the power cord through the AC power supply handle as shown in [Figure 8-30](#). Or go to step 3b.

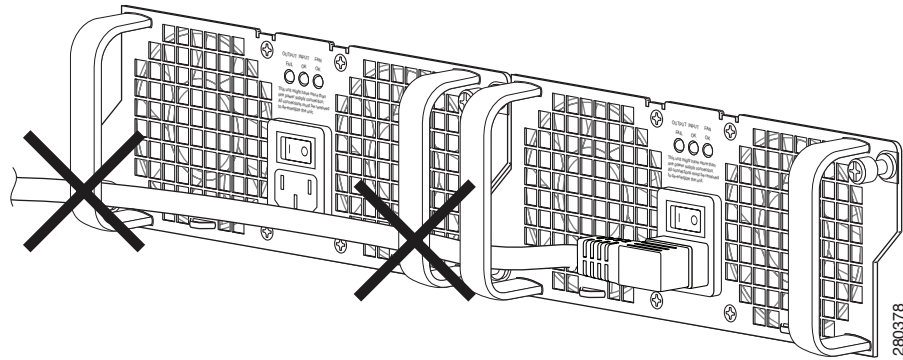
**Figure 8-30** Cisco ASR 1002 Router AC Power Supply and Cord in Slot 1

|   |               |
|---|---------------|
| 1 | AC power cord |
|---|---------------|

- b. Take the power cord and run it below the handles of the power supply in slot 1 and the power supply in slot 0 (left). Make sure the power cord is hanging loosely so that it cannot be disconnected from the AC power inlet.

**Figure 8-31** Cisco ASR 1002 Router AC Power Cord Through AC Power Supply 0 and 1**Caution**

Do not run the AC power cord through the either power supply handles as shown in [Figure 8-32](#).

**Figure 8-32 Cisco ASR 1002 Router Improper AC Power Cord Cabling****Note**

Using a tie wrap for the AC power cable is optional and not necessary. However, if you do attach the AC power cable to a power supply tab and then you remove the AC power cable for some reason, check for any damage to the cable after you cut the tie wrap off. If the power cord is damaged, replace it immediately.

**Step 4** Plug the AC power supply cable into the AC power source.

**Note**

Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.

**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

This completes the procedure for installing the AC power supply in the Cisco ASR 1002 Router.

## Removing and Installing a DC Power Supply in Cisco ASR 1002 Router

This section provides information about removing and installing a DC power supply in the Cisco ASR 1002 Router.

**Warning**

**When you install the unit, the ground connection must always be made first and disconnected last.**  
Statement 1046

**Warning**

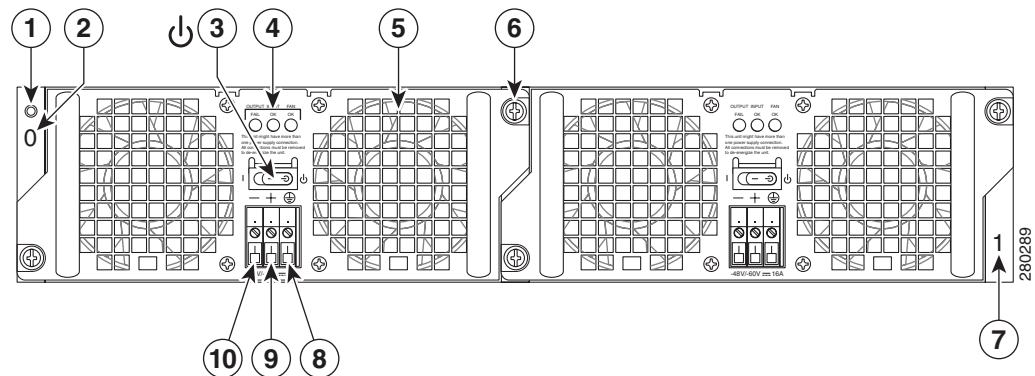
**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**  
Statement 1003

**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

Figure 8-33 shows the DC power supply and components for the Cisco ASR 1002 Router.

**Figure 8-33 Cisco ASR 1002 Router DC Power Supply**



|   |                                                                                                                            |    |                                            |
|---|----------------------------------------------------------------------------------------------------------------------------|----|--------------------------------------------|
| 1 | DC power supply ESD socket                                                                                                 | 6  | DC power supply captive installation screw |
| 2 | DC power supply slot 0 label                                                                                               | 7  | DC power supply slot 1 label               |
| 3 | DC power supply switch Standby/On (I)<br>(standby symbol is a broken circle with a<br>vertical line through the top of it) | 8  | Earth ground (GND)                         |
| 4 | DC power supply LEDs                                                                                                       | 9  | Positive lead                              |
| 5 | Fan                                                                                                                        | 10 | Negative lead                              |

**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**  
Statement 1003

**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

**Warning**

**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

## Removing the DC Power Supply from Cisco ASR 1002 Router

Before you can remove a DC power supply from the Cisco ASR 1002 Router, you must remove input power going to the power supply.



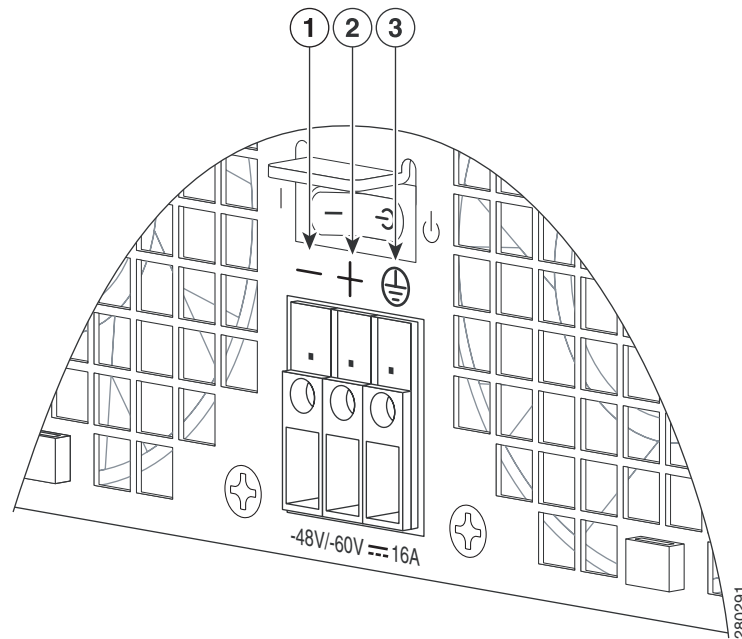
### Caution

Make certain that the chassis ground is connected before you begin removing and installing the power supply.

To remove the DC power supply from the Cisco ASR 1002 Router, follow this procedure:

- Step 1** Slip on the ESD-preventative wrist strap that was included in the accessory kit.
- Step 2** Place the power supply Standby switch in the Standby (see [Figure 8-34](#)) position.

**Figure 8-34 Cisco ASR 1002 Router DC Power Supply Terminal Block**



|          |                   |          |                                |
|----------|-------------------|----------|--------------------------------|
| <b>1</b> | Negative terminal | <b>3</b> | Earth ground terminal          |
| <b>2</b> | Positive terminal | <b>4</b> | DC power supply Standby switch |

- Step 3** Turn off the branch circuit breaker before touching terminal screws. Then start loosening terminal block screws to remove wires.
- Step 4** Remove the leads from the terminal block in this order.
  - a. Negative lead
  - b. Positive lead
  - c. Earth ground lead

**Step 5** Unscrew all of the power supply captive screws.



**Note** Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.



**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

**Step 6** Grasping the power supply handles, pull the power supply from the chassis.

**Step 7** Replace the DC power supply within five minutes.

This completes the procedure of removing a DC power supply from the Cisco ASR 1002 Router.

## Replacing the DC Power Supply in Cisco ASR 1002 Router

The DC power supply input connector is a euro-style terminal block. Features are provide for strain relieving the input wires from the terminal block on the front panel. The ground wire must contain a loop when secured to prevent any strain on the wires. The connection order is negative (–), positive (+), and GND. The recommended branch circuit breaker for the Cisco ASR 1002 Router DC power supply is 30Amp. Use an AWG #10 gauge wire on the 30Amp circuit.

This section describes how to connect the DC power supply in a Cisco ASR 1002 Router.



**Note**

The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.



**Warning**

**When you install the unit, the ground connection must always be made first and disconnected last.**  
Statement 1046

**Step 1** At the rear of the router, check that the power Standby switch is in the Standby position.

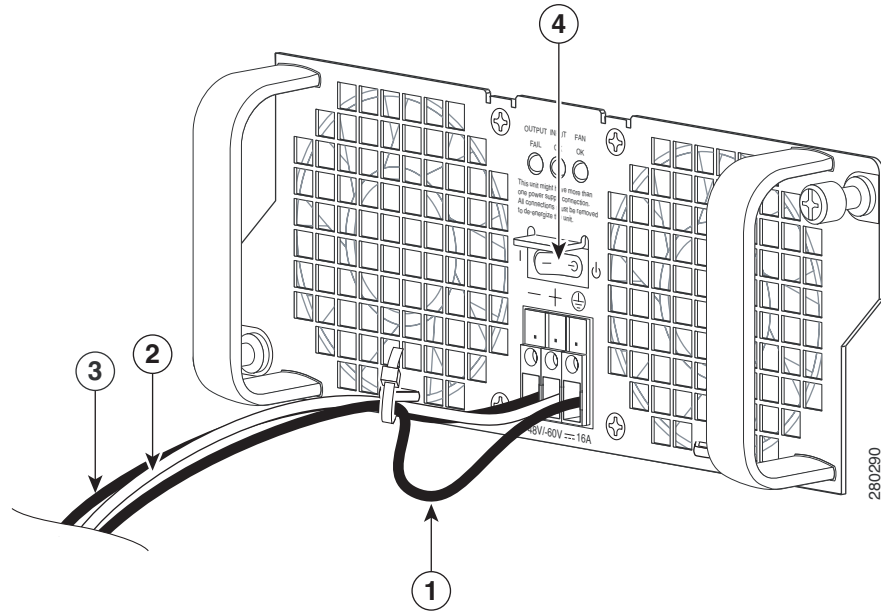
**Step 2** Ensure that the positive and negative leads are disconnected from the site power source and the source circuit breaker is turned off.

**Step 3** Using a wire stripper, strip approximately 0.55 inch (14 mm) from the negative, positive, and ground lead.



- Step 4** Insert the stripped end of the ground lead all the way into the ground lead receptacle on the DC-input power supply, and tighten the receptacle screw using a 3.5mm flat-blade screwdriver to a torque of 0.5 to 0.6Nm.

**Figure 8-35** Cisco ASR 1002 Router DC Power Supply Terminal Block Lead Wire Connection



|          |                                          |          |                                |
|----------|------------------------------------------|----------|--------------------------------|
| <b>1</b> | Earth ground lead wire with service loop | <b>3</b> | Positive lead wire             |
| <b>2</b> | Negative lead wire                       | <b>4</b> | DC power supply Standby switch |

- Step 5** Insert the stripped end of the positive lead all the way into the positive lead receptacle and tighten the receptacle screw using the same 3.5mm flat-blade screwdriver. Repeat this step for the negative lead.



**Note** Make sure the entire stripped end of each lead is inserted all the way into its receptacle. If any exposed wire at the stripped end of a lead is visible after inserting the lead into its receptacle, remove the lead from the receptacle, use the wire stripper to cut the stripped end of the lead, and repeat Step 3 through Step 5.

- Step 6** After tightening the receptacle screw for the ground, and leaving the extra service loop in the ground lead, use a cable tie to secure the three leads to the power supply faceplate tie-wrap tab.



**Caution**

When securing the ground, positive, and negative DC-input leads to the power supply faceplate, leave extra service loop in the ground lead to ensure that the ground lead is the last lead to disconnect from the power supply if a great deal of strain is placed on all three leads as shown in [Figure 8-35](#).

- Step 7** Turn the branch source breaker on.

- Step 8** Place the power supply standby switch to the On (I) position. The power supply LEDs light when power is supplied to the router.
- 

## Repacking the Box

If your system is damaged, you must repack it for return shipment.

To return or move the Cisco ASR 1000 series Router to a different location, follow these instructions for repacking the system, using the original packaging material:

- 
- Step 1** Place the bottom packing material section inside the bottom of the shipping container.
- Step 2** Use at least two people to place the Cisco ASR 1000 Series Router inside the container. Be sure that the chassis is positioned correctly before you lower it inside the container.
- Step 3** Place the top packing material over the top of the Cisco ASR 1000 Series Router.
- Step 4** Place both accessory boxes inside the cutouts in the top section of the packing material.
- Step 5** Fold the outside carton down over the top of the accessory boxes and seal with packing tape.
- Step 6** Wrap two packaging straps tightly around the top and bottom of the package to hold the outside carton and the bottom pallet.



**Caution** Do not use tape to hold the outside carton to the bottom pallet. Packaging straps must be used.

---

This completes the procedure for repacking the shipping container.



# APPENDIX A

## Cisco ASR 1000 Series Routers Specifications

This appendix provides router specifications and cable assemblies and pinouts for the cables shipped with the Cisco ASR 1000 Series Aggregation Services Routers.

This appendix includes the following topics for each Cisco ASR 1000 Series Routers:

- [Cisco ASR 1006 Router Specifications, page A-1](#)
- [Cisco ASR 1004 Router Specifications, page A-5](#)
- [Cisco ASR 1002 Router Specifications, page A-8](#)

## Cisco ASR 1006 Router Specifications

This section lists the specifications for the Cisco ASR 1006 Router.

[Table A-1](#) lists the Cisco ASR 1006 Router physical specifications.

**Table A-1** *Cisco ASR 1006 Router Specifications*

| Description                   | Specification                                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Midplane                      | Connects the Cisco ASR 1000 Series RP1, ASR 1000 Series ESP, Cisco ASR 1000 Series SPA Interface (SIP), SPAs, and power supplies together in the system |
| Dimensions (H x W x D)        | Height = 10.5 in. (25.4 cm)<br>Width = 17.25 in.(43.815 cm)<br>Depth = 22.50 in. (57.15 cm)                                                             |
| Weight                        | 109.1 pounds (fully loaded chassis)<br>49.5 kg                                                                                                          |
| Nominal operating temperature | <ul style="list-style-type: none"><li>• 41° to 104° F</li><li>• 5° to 40° C</li></ul>                                                                   |
| Nominal operating humidity    | 10% to 85%                                                                                                                                              |
| Storage temperature           | <ul style="list-style-type: none"><li>• –38° to 150° F</li><li>• –40° to 70° C</li></ul>                                                                |
| Power consumption             | <ul style="list-style-type: none"><li>• Maximum DC: 1700W</li><li>• Maximum AC: 1600W</li><li>• Maximum (Out): 1275W</li></ul>                          |

## Cisco ASR 1006 Router Memory and Storage Options

Table A-2 lists the hardware memory and storage options supported on the Cisco ASR 1006 Router.

**Table A-2** Memory and Storage Options for Cisco ASR 1006 Router

| Memory Type | Default                                                                 | Maximum System Support                                                   |
|-------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| RP1         | 2 GB DRAM                                                               | 4 GB DRAM                                                                |
| eUSB        | 1 GB (Partitioned: 2x32MB for NVRAM and the remaining for mass storage) | Hard disk drive 40 GB for code storage or solid-state drive 32Gb support |

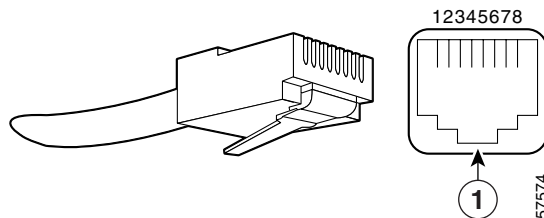
## Cisco ASR 1006 Router Ethernet RJ-45 Port Pinouts

The Cisco ASR 1006 Router has an RJ-45 port for the 10/100/1000 Ethernet connection. The RJ-45 port supports IEEE 802.3ab (Gigabit Ethernet) and IEEE 802.3u (Fast Ethernet) interfaces compliant with 10BASET, 100BASETX, and 1000BASET specifications.

The RJ-45 port supports standard straight-through and crossover Category 5 UTP cables with RJ-45 connectors. Cisco does not supply Category 5 UTP cables; these cables are available commercially.

Figure A-1 shows an RJ-45 port and connector.

**Figure A-1** RJ-45 Port and Connector for Cisco ASR 1006 Router



|   |                 |  |  |
|---|-----------------|--|--|
| 1 | RJ-45 connector |  |  |
|---|-----------------|--|--|

## Cisco ASR 1006 Router MGMT Ethernet Port Pinouts

Table A-3 lists the RJ-45 port pinout for the front panel Management Ethernet port.

**Table A-3** RJ-45 Management Ethernet Port Pinouts

| Pin  | Signal   | Direction | Description   |
|------|----------|-----------|---------------|
| 1    | TX Data+ | Out       | Transmit Data |
| 2    | TX Data- | Out       | Transmit Data |
| 3    | RX Data+ | In        | Receive Data  |
| 4, 5 | NC       |           |               |

**Table A-3** *RJ-45 Management Ethernet Port Pinouts (continued)*

| Pin | Signal   | Direction | Description  |
|-----|----------|-----------|--------------|
| 6   | RX Data– | In        | Receive Data |
| 7,8 | NC       |           |              |

## Cisco ASR 1006 Router BITS Port Signals and Pinouts

Table A-4 lists the pinouts of the front panel Building Integrated Timing Supply (BITS) RJ45 port.

**Table A-4** *BITS RJ-45 Receptacle Pinouts for Cisco ASR 1006 Router*

| Pin  | Signal  | Direction | Description     |
|------|---------|-----------|-----------------|
| 1    | RX Ring | Input     | Receive Ring    |
| 2    | RX      | Input     | Receive (T1/E1) |
| 3, 4 | N/C     |           |                 |
| 5    | TX Ring | Unused    |                 |
| 6    | TX      | Unused    |                 |
| 7,8  | N/C     |           |                 |

## Cisco ASR 1006 Router Console Port Signals and Pinouts

Table A-5 lists the pinouts of the dual RJ-45 ports for the front panel console and auxiliary ports.

**Table A-5** *Console Port Pinouts for Cisco ASR 1006 Router*

| Pin | Signal | Direction | Description                          |
|-----|--------|-----------|--------------------------------------|
| 1   | RTS    | Out       | Request to Send (tied to pin 8, CTS) |
| 2   | DTR    | Out       | Data Terminal Ready (always On)      |
| 3   | TXD    | Out       | Transmit Data                        |
| 4   | GND    | —         | Ring Indicator                       |
| 5   | GND    | —         |                                      |
| 6   | RXD    | In        | Receive Data                         |
| 7   | DSR    | In        | Data Terminal Ready                  |
| 8   | CTS    | In        | Clear to Send (tied to pin 1, RTS)   |

## Cisco ASR 1006 Router Auxiliary Port Signals and Pinouts

Table A-6 lists the pinouts of the dual RJ-45 ports for the auxiliary port signals.

**Table A-6** Auxiliary Port Pinouts for Cisco ASR 1006 Router

| Pin | Signal  | Direction | Description                        |
|-----|---------|-----------|------------------------------------|
| 1   | RTS     | Out       | Request to Send                    |
| 2   | DTR     | Out       | Data Terminal Ready (always On)    |
| 3   | TXD     | Out       | Transmit Data                      |
| 4   | RI      | —         | Ring Indicator                     |
| 5   | GND     | —         |                                    |
| 6   | RXD     | In        | Receive Data                       |
| 7   | DSR/DCD | In        | Data Set Ready/Data Carrier Detect |
| 8   | CTS     | In        | Clear to Send                      |

## Cisco ASR 1006 Router DB-25 Pinout Assignments for Alarm Relays

The alarm ports for the Cisco ASR 1006 Router (and Cisco ASR 1004 Router) power supplies reside on the DB-25 connector on the face of the power supply. The alarm ports are relay contact closures that the IOS environmental software controls. The environmental monitoring functions of the system can include voltage and temperature monitoring for the router installed components and failure sensing for power supply fan tray.

Any alarms that light the front panel LEDs on the Cisco ASR1000-RP1 causes a contact closure between the corresponding pins within the DB-25 alarm port of both power supplies. In the DB-25 connector, each alarm consists of a three-pin set containing a common pin, a normally open pin, and a normally closed pin. The connections that describe alarm activity are Alarm off (Common is connected to normally closed and normally open is disconnected) and Alarm on (Common is connected to normally open and normally closed is disconnected).

Table A-7 lists the common, normally open, and normally closed relay contacts accessible to an external alarm monitoring facility by means of the DB-25 connector.

**Table A-7** Cisco ASR 1006 Router DB-25 Alarm Connector Pinout Assignments

| Signal | Description                              | Common (CM) | Normally Open (NO) | Normally Closed (NC) | SPARE          |
|--------|------------------------------------------|-------------|--------------------|----------------------|----------------|
| CRTAA  | Critical Audible Alarm                   | 2           | 1                  | 14                   |                |
| MAJAA  | Major Audible Alarm                      | 16          | 3                  | 15                   |                |
| MINAA  | Minor Audible Alarm                      | 5           | 4                  | 17                   |                |
| CRTVA  | Critical Visual Alarm                    | 19          | 6                  | 18                   |                |
| MAJVA  | Major Visual Alarm                       | 8           | 7                  | 20                   |                |
| MINVA  | Minor Visual Alarm                       |             | 9                  |                      |                |
| SPARE  | SPARE—unused pin reserved for future use |             |                    |                      | 10, 11, 12, 13 |

# Cisco ASR 1004 Router Specifications

This section lists the specifications for the Cisco ASR 1004 Router.

Table A-8 lists the Cisco ASR 1004 Router physical specifications.

**Table A-8** Cisco ASR 1004 Router Specifications

| Description                   | Specification                                                                                                                                                                                                                                               |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Midplane                      | Connects the Cisco ASR 1000 Series RP1, ASR 1000 Series ESP, Cisco ASR 1000 Series SPA Interface (SIP), SPAs, and power supplies together in the system                                                                                                     |
| Dimensions (H x W x D)        | Height = 7 in. (17.8 cm) (4RU rack-mount per EIA RS-310)<br>Width = 17.25 in. (43.815 cm) (19 inch rack-mount or optional 23 Telco rack-mount)<br>Depth = 22.50 in. (57.15 cm) (including card handles, cable-management brackets and power supply handles) |
| Weight                        | 50 pounds (fully configured)<br>22.6796 kg                                                                                                                                                                                                                  |
| Nominal operating temperature | <ul style="list-style-type: none"> <li>41° to 104° F</li> <li>5° to 40° C</li> </ul>                                                                                                                                                                        |
| Nominal operating humidity    | 10% to 85%                                                                                                                                                                                                                                                  |
| Storage temperature           | <ul style="list-style-type: none"> <li>–38° to 150° F</li> <li>–40° to 70° C</li> </ul>                                                                                                                                                                     |
| Power consumption             | <ul style="list-style-type: none"> <li>Maximum DC: 1020W</li> <li>Maximum AC: 960W</li> <li>Maximum (Out): 765W</li> </ul>                                                                                                                                  |

## Cisco ASR 1004 Router Memory and Storage Options

Table A-9 lists the hardware memory and storage options supported on the Cisco ASR 1004 Router.

**Table A-9** Memory and Storage Options for Cisco ASR 1004 Router

| Memory Type | Default                                                                 | Maximum System Support                                                    |
|-------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------|
| RP1         | 2 GB DRAM                                                               | 4 GB DRAM                                                                 |
| eUSB        | 1 GB (Partitioned: 2x32MB for NVRAM and the remaining for mass storage) | For mass storage: hard disk drive 40 GB or solid-state drive 32Gb support |

## Cisco ASR 1004 Router Ethernet RJ-45 Port Pinouts

The Cisco ASR 1004 Router has RJ-45 port for the 10/100/1000 Ethernet connection. The RJ-45 port supports IEEE 802.3ab (Gigabit Ethernet) and IEEE 802.3u (Fast Ethernet) interfaces compliant with 10BASET, 100BASETX, and 1000BASET specifications.

The RJ-45 port supports standard straight-through and crossover Category 5 UTP cables with RJ-45 connectors. Cisco does not supply Category 5 UTP cables; these cables are available commercially. See [Figure A-1](#) to see an RJ-45 port and connector.

## Cisco ASR 1004 Router MGMT Ethernet Port Signals and Pinouts

[Table A-3](#) lists the RJ-45 port pinout for the front panel Management Ethernet port.

**Table A-10 RJ-45 Management Ethernet Port Pinouts for the Cisco ASR 1004 Router**

| Pin  | Signal   | Direction | Description   |
|------|----------|-----------|---------------|
| 1    | TX Data+ | Output    | Transmit Data |
| 2    | TX Data– | Output    | Transmit Data |
| 3    | RX Data+ | Input     | Receive Data  |
| 4, 5 | NC       |           |               |
| 6    | RX Data– | Input     | Receive Data  |
| 7,8  | NC       |           |               |

## Cisco ASR 1004 Router Console Port Signals and Pinouts

[Table A-11](#) lists the pinouts of the dual RJ-45 ports for the front panel console and auxiliary ports.

**Table A-11 Console Port Pinouts for Cisco ASR 1004 Router**

| Pin | Signal | Direction | Description                            |
|-----|--------|-----------|----------------------------------------|
| 1   | RTS    | Output    | Request to Send (tied directly to CTS) |
| 2   | DTR    | Output    | Data Terminal Ready (always On)        |
| 3   | TXD    | Output    | Transmit Data                          |
| 4   | GND    | —         | Ring Indicator                         |
| 5   | GND    | —         |                                        |
| 6   | RXD    | Input     | Receive Data                           |
| 7   | DSR    | Input     | Unused                                 |
| 8   | CTS    | Input     | Clear to Send (tied to RTS)            |



## Cisco ASR 1004 Router Auxiliary Port Signals and Pinouts

Table A-6 lists the pinouts of the dual RJ-45 ports for the auxiliary port signals.

**Table A-12** Auxiliary Port Pinouts for Cisco ASR 1004 Router

| Pin | Signal  | Direction | Description                        |
|-----|---------|-----------|------------------------------------|
| 1   | RTS     | Output    | Request to Send                    |
| 2   | DTR     | Output    | Data Terminal Ready (always On)    |
| 3   | TXD     | Output    | Transmit Data                      |
| 4   | RI      | —         | Ring Indicator                     |
| 5   | GND     | —         |                                    |
| 6   | RXD     | Input     | Receive Data                       |
| 7   | DSR/DCD | Input     | Data Set Ready/Data Carrier Detect |
| 8   | CTS     | Input     | Clear to Send                      |

## Cisco ASR 1004 Router BITS Port Signals and Pinouts

Table A-13 lists the pinouts of the front panel Building Integrated Timing Supply (BITS) RJ45 port.

**Table A-13** BITS RJ-45 Receptacle Pinouts for Cisco ASR 1004 Router

| Pin  | Signal  | Direction | Description         |
|------|---------|-----------|---------------------|
| 1    | RX Ring | Input     | Receive Ring        |
| 2    | RX TIP  | Input     | Receive TIP (T1/E1) |
| 3, 4 | N/C     |           |                     |
| 5    | TX Ring | Unused    |                     |
| 6    | TX TIP  | Unused    |                     |
| 7,8  | N/C     |           |                     |

## Cisco ASR 1004 Router DB-25 Pinout Assignments for Alarm Relays

Table A-14 lists the common, normally open, and normally closed relay contacts accessible to an external alarm monitoring facility by means of the DB-25 connector.

For more information about the DB-25 alarm connector, see [Cisco ASR 1006 Router DB-25 Pinout Assignments for Alarm Relays, page A-4](#).

**Table A-14** Cisco ASR 1004 Router DB-25 Alarm Connector Pinout Assignments

| Signal | Description                              | Common (CM) | Normally Open (NO) | Normally Closed (NC) | SPARE                      |
|--------|------------------------------------------|-------------|--------------------|----------------------|----------------------------|
| CRTAA  | Critical Audible Alarm                   | 2           | 1                  | 14                   |                            |
| MAJAA  | Major Audible Alarm                      | 16          | 3                  | 15                   |                            |
| MINAA  | Minor Audible Alarm                      | 5           | 4                  | 17                   |                            |
| CRTVA  | Critical Visual Alarm                    | 19          | 6                  | 18                   |                            |
| MAJVA  | Major Visual Alarm                       | 8           | 7                  | 20                   |                            |
| MINVA  | Minor Visual Alarm                       | 22          | 9                  | 21                   |                            |
| SPARE  | SPARE—unused pin reserved for future use |             |                    |                      | 10, 11, 12, 13, 23, 24, 25 |

## Cisco ASR 1002 Router Specifications

This section lists the specifications for the Cisco ASR 1002 Router.

Table A-15 lists the Cisco ASR 1002 Router physical specifications.

**Table A-15** Cisco ASR 1002 Router Specifications

| Description                   | Specification                                                                                                                                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Midplane                      | Connects the Cisco embedded ASR1000-RP1, ASR 1000 ESP5 or ESP10, SPAs, and power supplies together in the system                                                                                                                                   |
| Dimensions (H x W x D)        | Height: 3.5 in. (8.9 cm)<br>Width: 17.25 in. (19-inch rack-mount or optional 23 Telco adaptor brackets)<br>Depth: 22.50 in. (including card handles, cable-management brackets, and power supply handles) for mounting in a 600mm-enclosed cabinet |
| Weight                        | 40 pounds (fully configured)<br>18.143 k                                                                                                                                                                                                           |
| Nominal operating temperature | <ul style="list-style-type: none"> <li>41° to 104° F</li> <li>5° to 40° C</li> </ul>                                                                                                                                                               |
| Nominal operating humidity    | 10% to 85%                                                                                                                                                                                                                                         |

**Table A-15** Cisco ASR 1002 Router Specifications (continued)

| Description         | Specification                                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| Storage temperature | <ul style="list-style-type: none"> <li>–38° to 150° F</li> <li>–40° to 70° C</li> </ul>                                   |
| Power consumption   | <ul style="list-style-type: none"> <li>Maximum DC: 590W</li> <li>Maximum AC: 560W</li> <li>Maximum (Out): 470W</li> </ul> |

## Cisco ASR 1002 Router Memory and Storage Options

Table A-16 lists the hardware memory and storage options supported on the Cisco ASR 1002 Router.

**Table A-16** Memory and Storage Options for Cisco ASR 1002 Router

| Memory Type                   | Default                                                                                                        | Maximum System Support       |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------|
| RP 1– DRAM                    | 4 GB                                                                                                           | 4 GB – Not Field Upgradeable |
| FECP – DRAM                   | 1GB for ASR1000-ESP-5<br>2GB for ASR1000-ESP10                                                                 | 2 GB – Not Field Upgradeable |
| eUSB – Internal Flash + NVRAM | 8 GB on the built-in RP1 on the Cisco ASR 1002 Router (partitioned: 1 GB for bootflash; 7 GB for mass storage) | 8 GB – Not Field Upgradeable |

## Cisco ASR 1002 Router Ethernet RJ-45 Port Pinouts

The Cisco ASR 1002 Router has RJ-45 port for the 10/100/1000 Ethernet connections. The RJ-45 port supports IEEE 802.3ab (Gigabit Ethernet) and IEEE 802.3u (Fast Ethernet) interfaces compliant with 10BASET, 100BASETX, and 1000BASET specifications.

The RJ-45 port supports standard straight-through and crossover Category 5 UTP cables with RJ-45 connectors. Cisco does not supply Category 5 UTP cables; these cables are available commercially.

## Cisco ASR 1002 Router MGMT Ethernet Port Signals and Pinouts

Table A-3 lists the RJ-45 port pinout for the front panel Management Ethernet port.

**Table A-17** Management Ethernet 10/100/1000 RJ-45 Port Pinouts for Cisco ASR 1002 Router

| Pin  | Signal   | Direction | Description   |
|------|----------|-----------|---------------|
| 1    | TX Data+ | Output    | Transmit Data |
| 2    | TX Data– | Output    | Transmit Data |
| 3    | RX Data+ | Input     | Receive Data  |
| 4, 5 | NC       |           |               |
| 6    | RX Data– | Input     | Receive Data  |
| 7,8  | NC       |           |               |

## Cisco ASR 1002 Router Console Port Signals and Pinouts

Table A-5 lists the pinouts of the dual RJ-45 ports for the front panel console and auxiliary ports.

**Table A-18** Console Port Pinouts for Cisco ASR 1002 Router

| Pin | Signal | Direction | Description                     |
|-----|--------|-----------|---------------------------------|
| 1   | RTS    | Output    | Request to Send (tied to CTS)   |
| 2   | DTR    | Output    | Data Terminal Ready (always On) |
| 3   | TXD    | Output    | Transmit Data                   |
| 4   | GND    | —         | Ring Indicator                  |
| 5   | GND    | —         |                                 |
| 6   | RXD    | Input     | Receive Data                    |
| 7   | DSR    | Input     | unused                          |
| 8   | CTS    | Input     | Clear to Send (tied to RTS)     |

## Cisco ASR 1002 Router Auxiliary Port Signals and Pinouts

Table A-6 lists the pinouts of the dual RJ-45 ports for the auxiliary port signals.

**Table A-19** Auxiliary Port Pinouts for Cisco ASR 1002 Router

| Pin | Signal  | Direction | Description                        |
|-----|---------|-----------|------------------------------------|
| 1   | RTS     | Output    | Request to Send                    |
| 2   | DTR     | Output    | Data Terminal Ready (always On)    |
| 3   | TXD     | Output    | Transmit Data                      |
| 4   | RI      | —         | Ring Indicator                     |
| 5   | GND     | —         |                                    |
| 6   | RXD     | Input     | Receive Data                       |
| 7   | DSR/DCD | Input     | Data Set Ready/Data Carrier Detect |
| 8   | CTS     | Input     | Clear to Send                      |

## Cisco ASR 1002 Router BITS Port Signals and Pinouts

Table A-20 lists the pinouts of the front panel Building Integrated Timing Supply (BITS) RJ45 port.

**Table A-20** BITS RJ-45 Interface Pinouts for Cisco ASR 1002 Router

| Pin  | Signal  | Direction | Description         |
|------|---------|-----------|---------------------|
| 1    | RX Ring | Input     | Receive Ring        |
| 2    | RX TIP  | Input     | Receive TIP (T1/E1) |
| 3, 4 | N/C     |           |                     |
| 5    | TX Ring | Unused    |                     |
| 6    | TX TIP  | Unused    |                     |
| 7,8  | N/C     |           |                     |





## APPENDIX **B**

# Troubleshooting Initial Startup Problems

---

Your Cisco ASR 1000 Series Router went through extensive testing before leaving the factory. However, if you encounter problems starting the router, use the information in this chapter to help isolate the cause of the problems. This chapter contains the following sections:

- [Troubleshooting Overview, page B-13](#)
- [Online Troubleshooting Resources, page B-14](#)
- [General Troubleshooting Tips, page B-14](#)
- [Troubleshooting Using a Subsystem Approach, page B-15](#)

The procedures in this chapter assume that you are troubleshooting the initial system startup and that your router is in the original factory configuration.

If you have removed or replaced components or changed any default settings, the recommendations in this chapter might not apply. Make sure to review the safety warnings listed in the *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers* publication that accompanied your Cisco ASR 1000 Series Router before using the troubleshooting procedures in this chapter.

## Troubleshooting Overview

This section describes the methods used in troubleshooting the router. The troubleshooting methods are organized according to the major subsystems in the router.

If you are unable to solve a problem on your own, you can contact a Cisco customer service representative for assistance. When you call, have the following information ready:

- Date you received the router and the chassis serial number (label located on the chassis, see [Serial Number Label Location, page 1-17](#)).
- Installed SPAs.
  - Use the **show platform** command to determine which SPAs are installed if possible.
- Cisco software release number.
  - Use the **show version** command to determine this information if possible.
- Brief description of the symptoms and steps you have taken to isolate and solve the issue.
- Maintenance agreement or warranty information.

## Online Troubleshooting Resources

In addition to following the subsystems approach to troubleshooting, a variety of online troubleshooting resources are available.

- The *Cisco ASR 1000 Series Aggregation Services Routers Troubleshooting Guide* contains information to help you troubleshoot problems with the Cisco ASR 1000 Series Router.
- Cisco.com registered users can access various troubleshooting tools such as Software Advisor, Cisco IOS Error Message Decoder Tool, and Output Interpreter Tool from the [Troubleshooting Tools](#) menu after logging in at [http://www.cisco.com/kobayashi/support/tac/tools\\_trouble.shtml](http://www.cisco.com/kobayashi/support/tac/tools_trouble.shtml). Other [tools and utilities](#) are available to registered users after logging in at [http://www.cisco.com/en/US/support/tsd\\_most\\_requested\\_tools.html](http://www.cisco.com/en/US/support/tsd_most_requested_tools.html)

## General Troubleshooting Tips

Read the following general troubleshooting tips you might encounter at startup.

**Note**

You must always have two power supplies installed in the Cisco ASR 1000 Series routers to insure sufficient cooling for the box. The system fans are inside the power supply and must spin for cooling. Since all the system fans can be powered by one power supply, it is not required for the second power supply to be powered on, but it must be installed.

**Table B-1**      **General Startup Troubleshooting Tips**

| Symptom                          | Corrective Action                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System fails to power on         | Check that: <ul style="list-style-type: none"><li>• All power cords are properly connected to the Cisco ASR 1000 Series Router and at the power connection end.</li><li>• The power switch is in the I ON position.</li></ul>                                                                                                                                                                        |
| System fails to boot up properly | If your system has power, check the STATUS LED on the ASR 1000 Series RP1 and make certain all connections are secure.                                                                                                                                                                                                                                                                               |
| Power problems                   | <p>If the two power supplies are both showing GREEN on their Output LEDs, then a failure of one power supply will not result in a system failure.</p> <p>Only one operating power supply is required for a Cisco ASR 1000 series Router system to operate. Having only one supply powered is a supported configuration. If both supplies have an OUTPUT FAIL LED red, then the system will fail.</p> |



## Troubleshooting Using a Subsystem Approach

To solve a system problem, try to isolate the problem to a specific subsystem. Compare current router behavior with expected router behavior. Because a startup issue is usually attributable to one component, it is most efficient to examine each subsystem, rather than trying to troubleshoot each router component.

For troubleshooting purposes in this chapter, the router consists of the following subsystems:

- Power subsystem—Includes the following components:
  - AC-input or DC-input power supplies, also called power entry modules (PEMs). The Cisco ASR 1000 Series Router is shipped with fully-redundant PEMs installed in the chassis.
- Processor subsystem—The Cisco ASR1000 RP, ESPs, and SIPs all have onboard processors. The RP downloads software to each board in the system over the Ethernet Out of Band Channel (EOBC). There is a status LED on each board (RP1, ESP, SIP) that indicates the progress of loading software. The LED is red if ROMMON does not boot. If the board has booted ROMMON successfully, the LED is yellow. If operation software (IOS) has downloaded successfully, the LED is green.
- Cooling subsystem—Consists of three fans in each of the Cisco ASR 1006 Router and Cisco ASR 1004 Router power supplies and two fans in each of the Cisco ASR 1002 Router power supplies. The fans draw in air from each of the chassis and PEMs in a front to back direction.

## Normal Router Startup Sequence

You can generally determine when and where the power supply failed during the startup sequence by checking the status LEDs on the power supply modules.

In a normal router startup sequence, the following sequence of events and conditions occur:

1. The fan in each PEM receives power and begins drawing air through the power supply. The power supply PWR OK indicator is on and reflects power supply status.
2. As the power on and boot process progresses for the Cisco ASR 1000 Series RP1, ASR1000 ESPs, and each installed SIP, the status of each card is indicated by LEDs.

## Troubleshooting the Power Subsystem

Check the following to help isolate a problem with the power system:

**Table B-2**      *Troubleshooting the Power System*

| Symptom                   | Possible Cause                                                                  | Possible Solution                                                                                                                                                                                                                                |
|---------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System begins power on    | System has failed to boot.                                                      | There is a power fault in the chassis.<br><br>Note that the The system status LEDs are located on the Cisco ASR 1000 RP1 front panel. The LEDs stay amber during the entire IOS boot process and then turn green when IOS has completely booted. |
| System does not power on. | AC power cable not fully seated at system or at the wall outlet (power source). | Turn the router power switch to the standby position (I) and reseal the AC power cable at the system or at the wall outlet (power source).                                                                                                       |
|                           | DC power cable not turned on at the panel board of the circuit breaker.         | Turn the router power switch to the standby position (I) and locate the circuit breaker on the panel board that services the DC circuit; switch the circuit breaker to the on position.                                                          |
|                           | AC internal power cables are not fully seated from the power supply             | Turn the router power switch to the standby position (I) and remove and reinsert the power supply cable.                                                                                                                                         |
| System does not power on. | DC internal power cables are not fully seated on the terminal block.            | Check that all ground cables are properly seated in the terminal block on the DC power supply.                                                                                                                                                   |
|                           | Power source is faulty.                                                         | Turn the power source switch off, connect the power cable to another power source, if available, and turn the router power switch back on.                                                                                                       |
|                           | Faulty power cable.                                                             | Turn the router power switch to the standby position (I), (for DC power, also turn the circuit breaker to the Off position and tape it to that position), remove the cable and replace it.                                                       |
|                           | Faulty power supply.                                                            | If the system still fails to come up when the power supply is connected to a different power source with a new power cable, the power supply is probably faulty. Contact a service representative.                                               |

**Table B-2** *Troubleshooting the Power System (continued)*

| Symptom                                                  | Possible Cause        | Possible Solution                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System powers off, no STATUS LED, and no operating fans. | Power supply failure. | If the system is operating with only one power supply, it powers off after five minutes. If this occurs, you must remove all power cables from the power supply for at least 30 seconds before the power supply can be powered back up.**<br><br>Contact a service representative. |

\*\* Two power supplies must be installed in the chassis at all times to ensure sufficient cooling. The system fans are inside the power supply units and must spin for cooling. Because all the system fans can be powered by one power supply, the second power supply unit does not have to be powered on, but it must be installed.

**Caution**

If you remove a power supply, the system can run for a maximum of five minutes before the system shuts down. The fans and power elements are independent within the power supply. Therefore, it is not required that the replacement power supply be energized within five minutes. The only requirement is that the power supply be installed in the chassis, which energizes the fans and maintains proper system cooling.

## Troubleshooting the Cooling Subsystem

Check the following to help isolate a problem with the cooling subsystem:

**Table B-3** *Troubleshooting the Cooling Subsystem*

| Symptom                                                                                                                                                                                                                                                                                                                                          | Possible Cause                                                                                                                                                                                                                                                                                                                                                | Possible Solution                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| System shuts down, some fans may or may not continue to rotate, and this error message is displayed:<br><br>Queued messages:<br>%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown<br><br>This error message indicates that the system has detected an overtemperature condition or out-of-tolerance power condition inside the chassis. | <ul style="list-style-type: none"> <li>One or more fans are not operating.</li> <li>The fans are operating too slowly.</li> <li>The power supply is not operating.</li> </ul> <p>To determine if the fans are operating, listen for them. In noisy environments, place your hand on the rear of the chassis to feel if air is being forced out the vents.</p> | Contact a service representative.                                                                                                                |
| Multiple fan failure<br><br>Red indicates failed fan status<br><br>Amber indicates the Cisco ASR 1000 Series Route Processor 1 status                                                                                                                                                                                                            | Fan speed dropped below its fan fail speed                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Identify and log the failed fan PEM location.</li> <li>Recommend immediate replacement of PEM.</li> </ul> |

**Table B-3** *Troubleshooting the Cooling Subsystem (continued)*

| Symptom                                                                                                                                                                                                                                                                                                                                                                                               | Possible Cause                                                                                                                                                                                   | Possible Solution                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                       | Heated exhaust air from other equipment is entering the routers inlet vents.                                                                                                                     | Move other equipment or the router to ensure proper airflow.                                                                                                                                       |
| <p>System shuts down and this error message is displayed:</p> <pre>Queued messages: %ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown</pre> <p>This error message indicates that the system has detected an overtemperature condition or out-of-tolerance power condition inside the chassis.</p> <p><b>Note</b> The system fans may continue to operate although the system shuts down.</p> | <p>The error message could indicate a faulty component or temperature sensor. Before the system shuts down, use the <b>show env all</b> command to display the internal chassis environment.</p> | Contact a service representative.                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                       | If an environmental shutdown results from an out-of-tolerance power condition, the system shuts down.                                                                                            | If the system still fails to come up when the power supply is connected to a different power source with a new power cable, the power supply is probably faulty. Contact a service representative. |

## Troubleshooting the Shared Port Adapter

Check the following to help isolate a problem with the shared port adapter:

**Table B-4** *Troubleshooting the Shared Port Adapter*

| Symptom                                 | Possible Cause                                                        | Possible Solution                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Shared Port adapter ENABLED LED is off. | The shared port adapter might have pulled away from the system board. | <p>Reseat the adapter in its slot (you do not have to turn off the system power when removing or replacing port and service adapters). After the system reinitializes the interfaces, the ENABLED LED on the shared port adapter should go on.</p> <p>If the ENABLED LED remains off, the system detected a processor hardware failure. (This LED should be on in normal operation.) Contact a service representative for instructions.</p> |

# Troubleshooting the Upgrade

This section contains sample error messages that appear if an upgrade fails or if an upgrade is successful but the upgrade image is corrupted.

## Replacing or Recovering a Lost Password

This section describes how to recover a lost enable or console login password, and how to replace a lost enable secret password on your Cisco ASR 1000 Series Router.

**Note**

It is possible to recover the enable or console login password. The enable secret password is encrypted, however, and must be replaced with a new enable secret password.

## Overview of the Password Recovery Procedure

Following is an overview of the steps in the password recovery procedure:

**Step 1** If you can log in to the router, enter the **show version** command to determine the existing configuration register value.

**Step 2** Press the **Break** key to get to the bootstrap program prompt (ROM monitor). You might need to reload the system image by power cycling the router.

**Note**

To recover a lost password if the Break function is disabled on the router, you must have physical access to the router.

**Step 3** Change the configuration register so the following functions are enabled:

- a. Break
- b. Ignore startup configuration
- c. Boot from flash memory

**Note**

The key to recovering a lost password is to set the configuration register bit 6 (0x0040) so that the startup configuration (usually in NVRAM) is ignored. This allows you to log in without using a password and to display the startup configuration passwords.

**Step 4** Power cycle the router by turning power off and then back on.

**Note**

When powering off the router, wait 30 seconds before powering it on again.

**Step 5** Log in to the router and enter the privileged EXEC mode.

**Step 6** Enter the show startup-config command to display the passwords.

**Step 7** Recover or replace the displayed passwords.

- Step 8** Change the configuration register back to its original setting.
- 

## Details of the Password Recovery Procedure

Complete the following steps to recover or replace a lost enable, enable secret, or console login password:

- 
- Step 1** Attach an ASCII terminal to the console port on your router.
- Step 2** Configure the terminal to operate at 9600 baud, 8 data bits, no parity, and 1 stop bit (9600 8N1).
- Step 3** If you can log in to the router as a nonprivileged user, enter the `show version` command to display the existing configuration register value. Note the value for use later and proceed to Step 6. If you cannot log in to the router at all, go to the next step.
- Step 4** Press the Break key or send a Break from the console terminal. If Break is enabled, the router enters the ROM monitor, indicated by the ROM monitor prompt (`rommon1>`). Proceed to Step 6. If Break is disabled, power cycle the router (turn the router off or unplug the power cord, and then restore power after waiting 30 seconds). Then proceed to Step 5.
- Step 5** Within 60 seconds of restoring the power to the router, press the Break key or send a Break. This action causes the router to enter the ROM monitor and display the ROM monitor prompt (`rommon1>`).
- Step 6** Set the configuration register using the configuration register utility; enter the **config** command at the ROM monitor prompt as follows:

```
rommon1> config
```

- Step 7** Answer yes to the enable *ignore system config info?* question, and note the current configuration register settings.
- Step 8** Initialize the router by entering the reset command as follows:

```
rommon2> reset
```

The router initializes, the configuration register is set to 0x142, and the router boots the system image from flash memory and enters the System Configuration Dialog prompt as follows:

```
--- System Configuration Dialog ---
```

- Step 9** Enter no in response to the System Configuration Dialog prompts until the following message is displayed:

```
Press RETURN to get started!
```

- Step 10** Press Return. The user EXEC prompt is displayed as follows:

```
Router>
```

- Step 11** Enter the enable command to enter privileged EXEC mode. Then enter the `show startup-config` command to display the passwords in the configuration file as follows:

```
Router# show startup-config
```

- Step 12** Scan the configuration file display looking for the passwords (the enable passwords are usually near the beginning of the file, and the console login or user EXEC password is near the end). The passwords displayed look something like this:

```
enable secret 5 1ORPP$s9syZt4uKn3SnpuLDrhuei
enable password 23skiddoo
.
.
line con 0
password onramp
```

The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console login passwords may be encrypted or clear text. Proceed to the next step to replace an enable secret, console login, or enable password. If there is no enable secret password, note the enable and console login passwords, if they are not encrypted, and proceed to Step 17.

**Caution**

Do not execute the next step unless you have determined you must change or replace the enable, enable secret, or console login passwords. Failure to follow the steps as shown might cause you to erase your router configuration.

- Step 13** Enter the configure memory command to load the startup configuration file into running memory. This action allows you to modify or replace passwords in the configuration.

```
Router# configure memory
```

- Step 14** Enter the privileged EXEC configure terminal command to enter configuration mode:

```
Hostname# configure terminal
```

- Step 15** Change all three passwords using the following commands:

```
Hostname(config)# enable secret newpassword1
Hostname(config)# enable password newpassword2
Hostname(config)# line con 0
Hostname(config-line)# password newpassword3
```

Change only the passwords necessary for your configuration. You can remove individual passwords by using the no form of the above commands. For example, entering the no enable secret command removes the enable secret password.

- Step 16** You must configure all interfaces to be not administratively shut down as follows:

```
Hostname(config)# interface gigabitethernet 0/0
Hostname(config-int)# no shutdown
```

Enter the equivalent commands for all interfaces that were originally configured. If you omit this step, all interfaces are administratively shut down and unavailable when the router is restarted.

- Step 17** Use the config-register command to set the configuration register to the original value noted in Step 3 or Step 8, or to the factory default value 0x2102 as follows:

```
Hostname(config)# config-register 0x2102
```

- Step 18** Press Ctrl-Z (hold down the Control key while you press Z) or enter end to exit configuration mode and return to the EXEC command interpreter.

**Caution**

Do not execute the next step unless you have changed or replaced a password. If you skipped Step 13 through Step 16, skip to Step 20. Failure to observe this caution causes you to erase your router configuration file.

- Step 19** Enter the copy running-config startup-config command to save the new configuration to NVRAM.
- Step 20** Enter the reload command to reboot the router.
- Step 21** Log in to the router with the new or recovered passwords.

---

This completes the steps for recovering or replacing a lost enable, enable secret, or console login password.





## GLOSSARY

---

### A

|            |                                                                                                                                        |
|------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>AAA</b> | Authentication, Authorization and Accounting. The three primary services required by a network access server for managing subscribers. |
| <b>ACL</b> | Access Control List                                                                                                                    |
| <b>ACO</b> | Audible cutoff button—stops an external audible alarm                                                                                  |

---

### B

|                           |                                                                                                                                                                |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BBA</b>                | Broadband Aggregation. This term is used to refer to the dynamic binding of subscribers to revenue generating services.                                        |
| <b>BITS</b>               | Building Integrated Timing Source                                                                                                                              |
| <b>Blank filler plate</b> | An empty panel used to fill vacant subslots on a SIP. For proper operation, a SIP should be fully installed with either functional SPAs or blank filler plates |
| <b>BLT</b>                | Bandwidth Limited Traffic Stream. Used in the QOS context.                                                                                                     |
| <b>BootROM</b>            | Boot read-only memory.                                                                                                                                         |

---

### C

|                            |                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CI</b>                  | Cluster Interconnect.                                                                                                                                                                                                                                                                                                                     |
| <b>Cisco IOS XE</b>        | The operating system used to run the Cisco ASR 1000 Series Routers. Cisco IOS XE is released using consolidated packages and uses the same command-line interface as traditional Cisco IOS.                                                                                                                                               |
| <b>Cisco ASR1000-RP1</b>   | The Cisco ASR 1000 Series Route Processor 1 (RP1) addresses the route-processing requirements of carrier-grade IP and Multiprotocol Label Switching (MPLS) packet infrastructures. It provides advanced routing capabilities and also monitors and manages the other components in the Cisco ASR 1000 Series Aggregation Services Router. |
| <b>Cisco ASR1000-SIP10</b> | The Cisco ASR 1000 Series SIP provides the physical termination for the SPAs and accepts up to four half-height and two full height Cisco SPAs, supporting Ethernet, ATM, Packet over SONET/SDH (PoS), and Serial interfaces.                                                                                                             |
| <b>CAC</b>                 | Call Admission Control. This is the set of actions taken by a network during the set-up phase of a call event to determine whether the event should be accepted or rejected.                                                                                                                                                              |

|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Control address</b>                                | IP address on the SBE or DBE used for terminating the H.248 control traffic between SBE and SBE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Cisco ASR1000-ESP5 ASR1000-ESP10 ASR1000-ESP20</b> | <p>The Cisco ASR 1000 Series Embedded Service Processors (ASR1000-ESPs) are based on the Cisco QuantumFlow Processor for next-generation forwarding and queuing in silicon. The ASR1000-ESP5, ESP10, and ESP20 provide two centralized forwarding-engine options for the Cisco ASR 1000 Series Aggregation Services Routers.</p> <p>The Cisco ASR 1000 Series ESPs are responsible for the data-plane processing tasks and all network traffic flows through them. They are also responsible for features such as firewalls, intrusion prevention, Network Based Application Recognition (NBAR), and Network Address Translation (NAT).</p> |
| <b>Cisco ASR 1006 Router</b>                          | The Cisco ASR 1006 Router is a 6-rack unit (RU) chassis. It has the option of dual route processor and embedded services processor support with 10Gbps throughput support. It also supports up to 12 shared port adapters (SPAs), which makes it the highest port density solution of the three Cisco ASR 1000 Series Routers.                                                                                                                                                                                                                                                                                                              |
| <b>Cisco ASR 1004 Router</b>                          | The Cisco ASR 1004 Router is a 4-rack unit (RU) chassis that supports up to 8 shared port adapters (SPAs) and comes with one route processor and one embedded services processor slot. The Cisco ASR 1004 Router provides 10 Gbps throughput support.                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Cisco ASR 1002 Router</b>                          | The Cisco ASR 1002 Router is a 2-rack unit (RU) chassis that comes with an integrated route processor and a serial interface processor. It houses three shared port adapter (SPA) slots supporting half height and full height SPAs. Configurable with either the 5Gbps or 10Gbps embedded services processor and four built-in Gigabit Ethernet ports.                                                                                                                                                                                                                                                                                     |
| <b>Cisco QuantumFlow Processor</b>                    | The forwarding processor chipset, which is on the ESP, for the Cisco ASR 1000 Series Router                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>consolidated package</b>                           | A single software image containing multiple sub-packages and a provisioning file. Cisco IOS XE software is released using consolidated packages, and Cisco ASR 1000 Series Routers can be run using a consolidated package or individual packages.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>CPE</b>                                            | Customer premises equipment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>CTS</b>                                            | Cisco Trusted Security. Cisco-defined protocols and procedures for user and device authentication and role-based access control (includes packet tagging across network)                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

---

**D**

|              |                                                                                                                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DBE</b>   | Data border element. Represents the media-handling portion of the SBC, controlling access of media packets to the network.                                                                                                      |
| <b>DB-25</b> | AC power supply DB-25 alarm connector—A female DB-25 D-sub connector which enables you to attach an external alarm monitoring facility to the router, thus supporting a telco-style of handling alarm conditions in the router. |
| <b>DCE</b>   | Data communication equipment. Provide clocking to DTE. Console port of UART.                                                                                                                                                    |
| <b>DDR</b>   | Double Data Rate—Data transfer method that transfers data on both clock edges.                                                                                                                                                  |
| <b>DES</b>   | Data Encryption Standard algorithm                                                                                                                                                                                              |

|                        |                                                                                                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DHCP</b>            | Dynamic Host Configuration Protocol                                                                                                                                                                   |
| <b>Diagnostic mode</b> | A command mode in Cisco IOS XE where all the commands stored in the non-RPIOS sub-package are still accessible. All commands available in diagnostic mode are also available in privileged EXEC mode. |
| <b>DTE</b>             | Date Terminal equipment. Auxiliary ports of a UART.                                                                                                                                                   |
| <b>DUART</b>           | Dual Asynchronous Receiver/Transmitter. Used for the CONsole serial port.                                                                                                                             |

---

**E**

|                |                                                                                                                                                                                                                                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ESI</b>     | Enhanced SerDes Interconnect—Four serial links, each at 1.25-3.125Gbps, 24b/26b. These are the datapath links on the midplane connecting the RP, SIPs, and standby ESP modules to the active ESP.                                                                                              |
| <b>EBFC</b>    | Event-based flow control – packet-based protocol over SPA-SPI interface used by newer high-channel count, variable rate SPA's such as ATM to pass egress queue status deltas to the host.                                                                                                      |
| <b>EFC</b>     | Extended flow control – calendar-based interface used by high-channel count SPA's to pass egress queue status to the host.                                                                                                                                                                     |
| <b>EMIX</b>    | Typical traffic pattern including voice for a typical enterprise environment with a mix of packet sizes and with an average packet size of 250 bytes.                                                                                                                                          |
| <b>EOBC</b>    | Ethernet Out of Band Channel—Used for communication between the control processors on the Cisco ASR1000 chassis                                                                                                                                                                                |
| <b>ESP</b>     | Cisco ASR 1000 Series Embedded Services Processor. The ESP handles forwarding plane traffic and performs packet processing functions such as Firewall inspection, ACLs, encryption and QoS. Note that the Cisco ASR1000-ESP is also referred to as the "forwarding processor" in the document. |
| <b>ESPBase</b> | ASR1000rp1-esppbase.pkg. Provides the ESP operating system and control processes, and the ESP software.                                                                                                                                                                                        |
| <b>ESS</b>     | This is the QFP client that provides a framework for mapping edge switching services feature data from the control plane into QFP data plane data structures.                                                                                                                                  |
| <b>EV-FC</b>   | Event-based flow control - interface used for chip-to-chip communication of the status of egress queues, used on the embedded services processor                                                                                                                                               |

---

**F**

|                          |                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FECF</b>              | Forwarding engine control processor. A general purpose CPU on the forwarding processor primarily responsible for managing the forwarding engine and its connection to I/O. |
| <b>FH</b>                | Full height shared port adapter                                                                                                                                            |
| <b>FIB</b>               | Cisco Forwarding Information Base                                                                                                                                          |
| <b>Field-replaceable</b> | Cisco component can be returned if damaged                                                                                                                                 |

|                          |                                                                                                                                                                                                                                                                                                        |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FPD</b>               | Field-programmable device. General term for any hardware component implemented on router cards that supports separate software upgrades. SIPs and SPAs must have the right FPD version to function properly; an FPD incompatibility will disable all interfaces on the SPA or all SPAs within the SIP. |
| <b>FPD image package</b> | Used to upgrade FPD images. Whenever a Cisco IOS image is released that supports SPAs, a companion SPA FPD image package is also released for that Cisco IOS software release.                                                                                                                         |
| <b>FPDS</b>              | Forwarding Path Data Structures                                                                                                                                                                                                                                                                        |
| <b>FRU</b>               | Field-replaceable unit                                                                                                                                                                                                                                                                                 |

---

## G

|            |                                                                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GEC</b> | Gigabit Ether Channel. This is the logical aggregation of gigabit ethernet links for resiliency and load sharing as defined in the 802.3ad protocol. |
| <b>GRE</b> | Generic Route Encapsulation                                                                                                                          |

---

## H

|              |                                                                                                                                                                                                                                            |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HQF</b>   | Hierarchical Queuing Framework                                                                                                                                                                                                             |
| <b>H.248</b> | A VoIP signaling protocol, usually used between a dumb device and a clever controller. It is similar in functionality to Media Gateway Control Protocol (MGCP). It is used to communicate between SBC and DBE in a distributed SBC system. |
| <b>HH</b>    | Half height shared port adapters                                                                                                                                                                                                           |

---

## I

|               |                                                                                                                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IOCP</b>   | IO Control Processor. General purpose CPU managing the SPA's.                                                                                                                                                                                   |
| <b>IOS</b>    | Internetworking Operating System                                                                                                                                                                                                                |
| <b>IOSD</b>   | This refers to IOS daemon running as a process under Linux on the ASR1000- RP1. IOSD is the IOS process on IOS-SR. The bulk of the control plane, all routing protocols, configuration file management and so on all are the domain of IOSD.    |
| <b>IOS-SR</b> | The Linux-based software infrastructure running on the Cisco ASR1000 series routers.                                                                                                                                                            |
| <b>IPC</b>    | Inter Process Communication. Any method of passing data between processes running in separate address spaces.                                                                                                                                   |
| <b>ISSU</b>   | In service software upgrade. This refers to a software upgrade when the system is in use. This allows for two distinct versions of software running on a pair for ASR1000-RP1s while allowing for stateful switchover between the ASR1000-RP1s. |

---

**J**

---

**K**

---

**L**

|                    |                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LC</b>          | Line card                                                                                                                                                                                                                    |
| <b>LDP</b>         | Label Distribution Protocol                                                                                                                                                                                                  |
| <b>LIPC</b>        | Local IPC between two processes                                                                                                                                                                                              |
| <b>Location ID</b> | A location ID is configured on each data border element (DBE). The signaling border element (SBE) may associate endpoints with a particular location ID and then use the location IDs to route calls between different DBEs. |

---

**M**

|                      |                                                                                                                                                                                                                    |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Media address</b> | Pool of IP addresses on the DBE for media relay functionality. A pool of addresses is defined for the Global VPN that the DBE is attached to. All vDBEs within the DBE draw media addresses from this pool.        |
| <b>MGCP</b>          | Media Gateway Control Protocol. This is a VoIP signaling protocol, usually used between a dumb device and a clever controller. It is similar in functionality (if not syntax) to H.248. It is defined in RFC 2705. |
| <b>MPLS</b>          | Multi-Protocol Label Switching                                                                                                                                                                                     |

---

**N**

|                      |                                                                                                                                                                                                                        |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NAT</b>           | Network Address Translation. This is a program or piece of hardware that converts an IP address from a private address to a public address in real time. It allows multiple users to share a single public IP address. |
| <b>NAT traversal</b> | Detects that the endpoints are behind a NAT device.                                                                                                                                                                    |
| <b>NBAR</b>          | Network-based Application Recognition                                                                                                                                                                                  |

**NMI** Non-maskable Interrupt

**NSF** Non-Stop Forwarding

---

## O

**OBFL** On-board failure logging

**OID** Values are defined in specific MIB modules. The Event MIB allows a user or an NMS to watch over specified objects and to set event triggers based on existence, threshold, and boolean tests. An event occurs when a trigger is fired; this means that a specified test on an object returns a value of true. To create a trigger, a user or an NMS configures a trigger entry in the mteTriggerTable of the Event MIB. This trigger entry specifies the OID of the object to be watched. For each trigger entry type, corresponding tables (existence, threshold, and boolean tables) are populated with the information required for carrying out the test. The MIB can be configured so that when triggers are activated (fired) either an SNMP Set is performed, a notification is sent out to the interested host, or both.

**OIR** Online Insertion and Removal. Feature that permits the addition, the replacement, or the removal of cards without interrupting the system power, entering console commands, or causing other software or interfaces to shutdown. Sometimes called hot swapping.

---

## P

**PDU** Power distribution unit

**PEM** Power entry module

**Persistent telnet** A configuration that uses transport maps to manage the handling of users accessing the router via telnet.

**Persistent SSH** A configuration that uses transport maps to manage the handling of users accessing the router via SSH.

**PID** Product identifier

**PLL** Phase Locked Loop

**POR** Power-On Reset

**PQ** Priority queue

**Provisioning file** A file that manages the boot process when a Cisco ASR 1000 Series Router is configured to run using individual packages. Provisioning files are included with the individual sub-packages in consolidated packages, and boot statements must point to the provisioning file as the booting file when the router is run using individual packages.

---

## Q

**QDR** Quad Data Rate. Transfer method over separate read/write busses.

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>QoS</b>                   | Quality of Service                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>QFP</b>                   | Cisco Quantum Flow Processor. One of Cisco-developed network processors on the Cisco ASR1000-ESPs                                                                                                                                                                                                                                                                                                                                                  |
| <hr/>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>R</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>RP</b>                    | The Cisco ASR 1000 Series RP1, route processor. General purpose CPU responsible for routing protocols, CLI, network management interfaces, code storage, logging, chassis management. The ASR 1000 Series RP1 processes network control packets as well as protocols not supported by the ASR 1000 Series ESP.                                                                                                                                     |
| <b>RPBase sub-package</b>    | The sub-package responsible for providing the operating system software for the Route Processor.                                                                                                                                                                                                                                                                                                                                                   |
| <b>RPControl sub-package</b> | The sub-package responsible for providing the control plane processes between the IOS process and the rest of the router.                                                                                                                                                                                                                                                                                                                          |
| <b>RPACCESS sub-package</b>  | The sub-package responsible for the processing of restricted components such as security features.                                                                                                                                                                                                                                                                                                                                                 |
| <b>RPAccess K9</b>           | ASR1000rp1-rpaccessk9.pkg. The crypto RPAccess image. This is the RPAccess sub-package in consolidated packages that support crypto.                                                                                                                                                                                                                                                                                                               |
| <b>RPIOS sub-package</b>     | The sub-package responsible for storing and running Cisco IOS features.                                                                                                                                                                                                                                                                                                                                                                            |
| <b>RU</b>                    | Rack Unit. A rack unit is 1.76 inches                                                                                                                                                                                                                                                                                                                                                                                                              |
| <hr/>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>S</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>SBC</b>                   | Cisco Session border controller. The SBC is a session-aware device which controls access to voice over IP (VoIP) and other types of primarily media-related networks. The primary purpose of an SBC is to protect the interior of the network from excessive call load and malicious traffic. Cisco Session Border Controller protocol implementation performs the voice and video gateway functions simultaneously with regular IP data services. |
| <b>SBE</b>                   | Signaling border element. Represents the signaling agent of the SBC to handle all call processing through SIP or H.323 protocols and in general performs the call control functions. An SBE typically controls one or more media gateways.                                                                                                                                                                                                         |
| <b>Serial Link</b>           | A single transmit and receive serial pair running initially at 1.25Gbits giving a payload of 1.0Gbits, with future scalability to 3.125 Gbits giving a payload of 2.5 Gbits.                                                                                                                                                                                                                                                                       |
| <b>SFP</b>                   | Small form-factor pluggable (SFP) optical transceivers to provide network connectivity. An SFP module is a transceiver device that mounts into the front panel to provide network connectivity.                                                                                                                                                                                                                                                    |
| <b>SLA</b>                   | Service Level Agreement. The contract between a service provider and the customer that specifies the level of service provided.                                                                                                                                                                                                                                                                                                                    |
| <b>SIP (SBC)</b>             | Session initiation protocol. VoIP signaling protocol.                                                                                                                                                                                                                                                                                                                                                                                              |

|                            |                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SIP</b>                 | Shared port adapter interface processor. A SIP is a platform-specific carrier card that inserts into a router slot like a line card. A SIP can hold one or more SPAs in its subslots, depending on the SIP type. The SPA provides the network interface. The SIP provides the connection between the route processor (RP1) and the SPA. |
| <b>SIPBase sub-package</b> | The sub-package responsible for providing the SPA drivers, the SPA FPGA, and any other software related to the SPAs.                                                                                                                                                                                                                    |
| <b>SIPSPA sub-package</b>  | The sub-package responsible for controlling the SIP operating system and control processes.                                                                                                                                                                                                                                             |
| <b>SFP</b>                 | Small form-factor pluggable optical transceiver. A type of fiber optic receptacle device that mounts flush with the front panel to provide network connectivity.                                                                                                                                                                        |
| <b>Single height</b>       | Describes the dimension of a SPA that occupies a single SIP subslot or half of the SIP.                                                                                                                                                                                                                                                 |
| <b>Sub-package</b>         | A single software file on the Cisco ASR 1000 Series Router. Cisco IOS XE software is released using consolidated packages, and these consolidated packages contain multiple sub-packages. Each sub-package has a defined responsibility for running a Cisco ASR 1000 Series Router.                                                     |
| <b>SPA</b>                 | Shared Port Adapter. A SPA is a modular, platform-independent shared port adapter that inserts into a subslot of a compatible SIP carrier card to provide network connectivity and increased interface port density. The SPA provides the interface between the network and the SIP.                                                    |
| <b>SSD</b>                 | Solid state disk drive.                                                                                                                                                                                                                                                                                                                 |
| <b>SSO</b>                 | Stateful switchover. Action of transitioning from one operational unit to another without loss of checkpointed state.                                                                                                                                                                                                                   |
| <b>STP</b>                 | Shielded twisted-pair                                                                                                                                                                                                                                                                                                                   |
| <b>Subslot</b>             | Secondary slot on a SIP where a SPA is installed.                                                                                                                                                                                                                                                                                       |
| <b>Serial Link</b>         | A single transmit and receive serial pair running initially at 1.25Gbits giving a payload of 1.0Gbits, with future scalability to 3.125 Gbits giving a payload of 2.5 Gbits.                                                                                                                                                            |
| <b>Serial Link</b>         | A single transmit and receive serial pair running initially at 1.25Gbits giving a payload of 1.0Gbits, with future scalability to 3.125 Gbits giving a payload of 2.5 Gbits.                                                                                                                                                            |

---

**T**

|                      |                                                                                                                                                                                                                 |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transport map</b> | A configuration option that can be used to provide more granularity related to users accessing a router. Transport maps can be applied to console ports or to any users accessing a router using telnet or SSH. |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



**Tracing** A function on the ASR 1000 Series Routers that logs internal events. Tracing cannot be disabled on the Cisco ASR 1000 Series Router, and all tracing logs are stored in trace files.

**Trace files** Files that are automatically generated on the Cisco ASR 1000 Series Router that store trace data. Trace files are usually stored automatically in a storage directory and are often useful for customer support purposes.

---

## U

**UDLR** Uni-Directional Link Routing

**UTP** Unshielded twisted pair

---

## V

**VAC** Volts alternating current

**VDC** Volts direct current

**VCCV** Virtual Circuit Connection Verification

**vDBE** Virtual DBE. Represents a resource partition within a DBE. A vDBE is a type of media gateway. Each vDBE can be controlled by a separate SBE using the H.248 protocol.

**VID** Version ID

**VRF** Virtual Routing and Forwarding Instances

**Virtual circuit** Logical circuit created to ensure reliable communication between two network devices. A virtual circuit is defined by a VPI/VCI pair, and can be either permanent (PVC) or switched (SVC). Virtual circuits are used in Frame Relay and X.25. In ATM, a virtual circuit is called a virtual channel.

**VoIP** Voice over Internet Protocol. The capability to carry normal telephony-style voice over an IP-based internet with POTS-like functionality, reliability, and voice quality. VoIP enables a router to carry voice traffic (for example, telephone calls and faxes) over an IP network. In VoIP, the DSP segments the voice signal into frames, which then are coupled in groups of two and stored in voice packets. These voice packets are transported using IP in compliance with ITU-T specification H.323.

**VPI** Virtual path identifier. 8-bit field in the header of an ATM cell. The VPI, together with the VCI, identifies the next destination of a cell as it passes through a series of ATM switches on its way to its destination. ATM switches use the VPI/VCI fields to identify the next VCL that a cell needs to transit on its way to its final destination. The function of the VPI is similar to that of the DLCI in Frame Relay.

**VRRP** Virtual Router Redundancy Protocol

---

## W

**X**

**Y**

**Z**



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